THE WEEK'S EVENTS

Morgan Answers Charge of Irresponsibility

He tells TVA investigators alleged vagaries were sound planning suggestions

Testifying before the Congressional TVA investigating committee as it resumed at Knoxville, after a lapse of a month and a half, the hearings which were begun in Washington last May, Arthur E. Morgan devoted the major part of his testimony to answering charges of irresponsibility.

The deposed chairman made a strong attack on H. A. Morgan for comments at the Washington hearing on his "vagaries" and "alarming, wild and impractical proposals." He also resented the intimation that he had sought to make himself dictator of TVA.

Morgan reviewed the proposals he had made at the first meeting of the TVA board in 1933. A suggestion he made which was not approved by the other directors was that TVA build a town to house workers on Norris Dam before dam construction got under way.

He wanted planning for roads leading to the construction site, and agreements with the state of Tennessee as to what it would do in this connection; he wanted to recruit some labor for the dam from the distressed towns around abandoned coal mines.

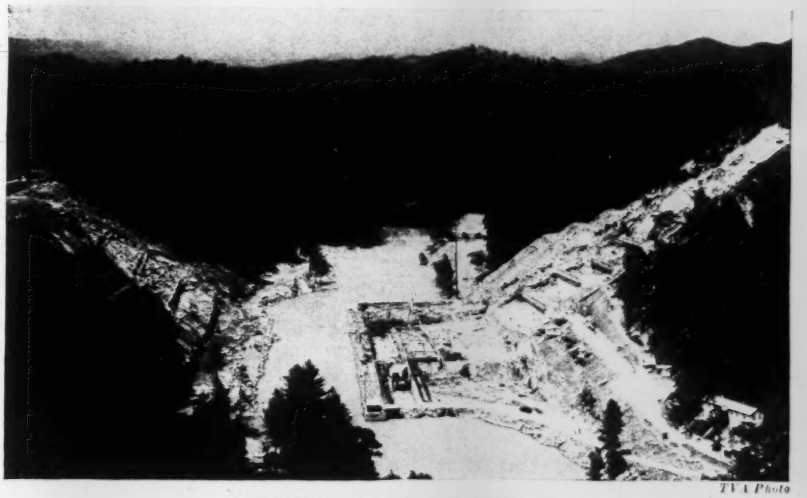
Morgan said that he wanted an expert to study the possible danger of caves which might drain some of the proposed reservoir. He actually did prevent, he said, by publicity and the cooperation of real estate men, looting of investors such as occurred through the sale of lots.

He wanted the Federal Power Commission to deny licenses for any private dams in the valley, and although he wanted particular TVA dams to be built only as the need for them developed, he wanted the whole project mapped out and integrated.

Denies dictatorship

The dictatorship issue, Morgan said, was based on his request at an early meeting of the board to be made general manager. He said, however, that he had asked for the appointment only as a temporary one.

In opening his testimony, Morgan renewed before the committee the attack which he had previously made in correspondence on the appointment of Thomas A. Panter as chief engineer of the investigating committee. Morgan based his objection on Panter's association in the Los Angeles municipal power system with E. F. Scattergood, with whom he said he had had considerable controversy in the early days of the TVA. The board took no action.



TVA Photo

CONCRETING BEGINS AT HIWASSEE

FIRST STAGE concreting has begun on Hiwassee Dam, TVA project on the Hiwassee River in southwestern North Carolina. The gravity concrete structure, 1,255 ft. long and more than 300 ft. high, will have a controlled flood storage capacity of 360,000 acre-ft. It will contain 800,000 cu.yd. of concrete.

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Andrews to Administer Wage-Hour Bill

Elmer F. Andrews, New York State Industrial Commissioner, and for many years a practicing civil engineer, has been nominated by President Roosevelt as administrator of the federal Labor Standards Act, the minimum-wage-maximum hour law passed by the last session of Congress.

Andrews is a graduate in civil engineering of Rensselaer Polytechnic Institute, class of 1915. His engineering experience includes construction of sugar warehouses and a railroad in Cuba, erection of factories in New York State, a period as assistant engineer in the construction department of the New York Central R.R., as assistant engineer for the Bangor-Aroostook R.R., and as estimating engineer on the Seaboard Airline. He was also for a time manager of the highways and bridges bureau of the Queensboro Chamber of Commerce, New York City.

He has been in government service since 1929 when he was appointed deputy industrial commissioner of New York State. He was made commissioner in 1933 and has held the post since.

PWA Allots Funds For Power Projects

Competitive projects are made conditional on reasonable efforts to purchase existing utilities

Presidential approval has been announced for PWA allotments for 45 power projects with a total estimated cost of $28,328,000. Allotments to 21 of these projects, which, if erected, would operate in competition with existing privately owned power facilities, are made conditional upon the sponsors satisfying Administrator Ickes that they have been unable, after reasonable efforts made in good faith, to acquire upon reasonable terms and conditions the facilities of the existing private utility with which the applicant might be in competition. This condition was imposed in accordance with the new rule for PWA power allotments announced early this month (*ENR*, July 14, 1938, p. 35).

The remaining 24 power projects will not compete with existing privately owned systems and are therefore exempt from the new restrictions.

Allocation of $10,750,000 for the construction of four Bonneville transmission lines was approved July 19 by the Public Works Administration. A grant of $78,750 as a contribution toward improvements on the Lincoln, Neb., municipally-owned power plant also was approved.

Early this week, PWA allotments passed the half billion point. At that time PWA had allotted $500,328,000 for 3,086 PWA projects, federal and non-federal. Of the money allotted, $38,302,000 was in loans and the remainder in grants. These projects had a total construction cost, including sponsors' contributions, of $814,873,000.

Larger allotments

Recent PWA allotments of particular interest include an additional grant of $2,850,000 and a new loan of $4,500,000 to the lower Colorado River Authority project near Austin, Tex. This project had already received, under the 1935 PWA program, a loan of $10,500,000 and a grant of $4,500,000.

The entire project calls for construction of four power plants: two flood storage dams, one of them being built by the Bureau of Reclamation under a separate project, and two non-storage hydroelectric developments of substantial proportions.

An allotment of $1,250,000 has been made to the Bureau of Reclamation for the purpose of widening the base of the Marshall Ford Dam on the Colorado River, 12 miles northwest of Austin, Tex., to make the dam suitable to act as the foundation for a high dam to be built in the future for flood control.

The Santee-Cooper power project in South Carolina has received an additional grant of $4,500,000. This, in addition to the previous loan of $5,775,000 and grant of $225,000, brings to $10,500,000 the amount of federal funds now alloted to the project.

The project provides for construction in the Santee and Cooper Rivers of dams to store about 1,400,000 acre-ft. of water, a canal between the reservoirs, a hydroelectric generating plant, and a system of electric transmission lines.

An allotment of $4,795,000 has been made for a $10,000,000 section of the East River Drive express highway in New York City. The allocation will be used to complete sections of the drive from 51st St. to 99th St. In this section, the drive will be a six lane arterial highway. Portions totaling sixteen blocks will be carried on a double deck elevated steel viaduct, and a one block section from 88th to 89th St. will be in subway. There will be park areas all along the drive. A section of the drive between Houston and 14th St. has already been completed by the borough of Manhattan and the Triboro Bridge Authority has completed a section between 99th and 125th Streets.

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PWA Penalizes City For Hiring Lobbyist

PWA Administrator Ickes on July 12 suspended an application from the city of Riverside, Calif. for a PWA allotment for a $953,000 sewer system because the city contracted with a lobbyist to obtain approval of its project. No further action, the administrator stated, will be taken on the application until the city "explains the engagement of a lobbyist, one Glenn Miller, and the proposed payment to him of public funds."

"Such an arrangement," Ickes stated in a telegram to Mayor Evans of Riverside, "in addition to being totally unnecessary and, in my opinion, a misuse of public funds, is wholly in violation of policies enunciated by me and by the President of the United States. . . . It is completely in violation of regulations of the PWA which forbid the payment of any bonus or commission. . . . The application of the city of Riverside for this project will remain suspended until you can show satisfactorily why employment of Miller was necessary and until you can show why PWA regulation should not be enforced."

Administrator Ickes stated that the principles set forth in his telegram apply to all PWA applications.

Disbursements Lag Behind Allotments

But federal expenditures for half-month are greater than the same period last year

Washington Correspondence

Government press agents are putting all their emphasis on allocations and earmarkings of funds. No stories are being written about the amounts actually being disbursed. Despite the emphasis that has been placed for the last decade upon the need for the planning of public works in advance, it is known that relatively few of the projects in the new non-federal PWA program are ready to go.

The plan is to increase WPA activities during the period the PWA is getting underway. Some success is attending these efforts. During the first half of July WPA disbursements were 25 per cent greater than during the corresponding period of last year and by coincidence about 25 per cent over the average rate of expenditures for the last fiscal year.

Non-relief expenditures showing an increase during the first two weeks of July over the average for the last fiscal year are: federal buildings; highways; slum clearance; army; navy; agricultural adjustment program; TVA.

The rate of such general non-relief expenditures however was below the fiscal year average, although 15 per cent greater than the outlay during the first half of July last year.

The so-called emergency expenditures for recovery and relief, aggregating $100,000,000 for the first two weeks of July, are slightly above the average for the preceding twenty-four semi-monthly periods. Such disbursements showing an increase were: rivers and harbors and flood control work; Farm Security Administration expenditures; and home loans.

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Louisiana Increases Truck Weight Limits

The permissible net load on trucks operating over Louisiana highways has been raised from 7,000 lb. to 8,000 lb. under a law passed by the last session of the legislature and going into effect July 27. The new law also increases the limitation for a truck-tractor semi-trailer unit from 10,000 to 14,000 lb.

Total axle load limitations are also imposed in the new law. Axles equipped with high pressure pneumatic or solid rubber tires are limited to 16,000 lb., and axles with low pressure tires to 18,000 lb.

Queens Tunnel Fire Still a Mystery

The cause and extent of the fire in the north Manhattan heading of the Queens Midtown tunnel in New York that resulted in flooding of the heading on June 26 are still unknown, for as yet no attempt has been made to unwater or enter the bore. An earlier report of the fire, which occurred in high air pressure during a Sunday shutdown, causing a blow at the face that flooded the section, was given in these pages June 30, 1938, p. 889.

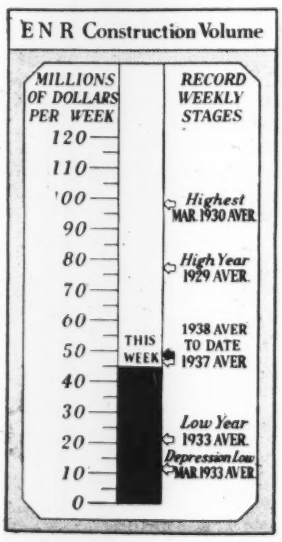
Contracting and engineering officials are too concerned with the adjacent south heading to bother with the north heading at present. The face of the south heading is still in filled ground and riprap.

On last Sunday, after the face of the south heading had been mudded up and breasted for the week-end layoff, the bulkhead suddenly started to move away from the shield, and a blowout seemed almost certain. Fortunately, the contractor was able to gather up enough workmen in a hurry and plug the threatened blow. A bad boil about 30 ft. ahead of the present location of the south shield has remained in one place for some time. The contractors hope this indicates the end of the bad ground and that a tighter face will be found beyond the boil. After the south shield has passed into better ground, the fire-damaged section will be tackled.

CONTRACTS AND CAPITAL

ENGINEERING construction awards for the week, $45,035,000, are 12 per cent below the preceding week and 47 per cent above the corresponding week of 1937. Public contracts are 138 per cent above last year and private contracts are 40 per cent below. Federal awards are 343 per cent above last year and 136 per cent above last week. The greatest gain recorded this week is in earthwork and drainage awards which include three contracts that amount to $7,800,000. Classified totals for the current week are: waterworks, $442,000; sewers, $546,000; bridges, $2,970,000; streets and roads, $13,168,000; earthwork and drainage, $9,684,000; public buildings, $3,618,000; commercial buildings, $5,379,000; industrial buildings, $1,261,000; unclassified, $7,967,000.

New capital for the week totals $55,065,000. The current week's total is made up of $7,542,000 in state and municipal bonds, $36,477,000 in PWA allotments for state and municipal construction and $11,046,000 for federal projects. The Reconstruction Finance Corporation sold 80 PWA issues of securities at a sale price of $8,134,465, a net premium of $322,465. This amount has been transferred from federal to private investment financing in the new capital figures.



CONTRACTS

(Thousands of dollars)

	Week Ending July 22 1937	July 14 1938	July 21 1938
Federal	$2,167	$4,063*	$9,504
State & Municipal	12,859	27,629	26,098
Total public	$15,026	$31,692*	$35,602
Total private	15,669	19,568	9,343
TOTALS	$30,695	$51,260*	$45,035
Cumulative 1938 (29 weeks)			$1,429,548
Cumulative 1937 (29 weeks)			$1,458,036

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

* *Revised.*

NEW PRODUCTIVE CAPITAL

	1937 29 Wk.	Cumulative 1938 29 Wk.
NON-FEDERAL	$881,002	$1,265,467
State & Mun. bonds	308,591	371,264
Corporate securities	302,437	191,938
PWA loans, grants	40,035	321,309
RFC loans	29,939	57,157
U.S.H.A. loans	....	111,070
R.E.A. loans	....	11,229
Federal Aid-Highways	200,000	201,500
FEDERAL	57	1,133,651
TOTAL CAPITAL	$881,059	$2,399,318

FHA MORTGAGES

	1937 28 Wk.	Cumulative 1938 28 Wk.
Mortg. selected for appraisal	$352,430	$507,255

ENR INDEX NUMBERS

Index Base		1913	1926
Construction Cost	July	232.29	111.66
Building Cost	July	194.39	105.08
Volume	June	166	73

Boston-Washington Highway Likely

Report to Congress will probably suggest it as first of proposed super highways

Washington Correspondence

In the report on super highways which the Bureau of Public Roads will make to the next Congress, the opinion probably will be expressed that the first continuous highway of this type may be expected to connect Boston and Washington. The report probably will state that the greatest obstacle in the path of such a project is the difficulty of securing the land. The expense of the project is another formidable obstacle, but this can be reduced to some extent, it is believed, by excess condemnation. The report probably will state that the project would present no unusual engineering difficulties.

If there is resort to excess condemnation, the report probably will recommend the creation of a government corporation that could begin to acquire land well in advance of actual construction.

All the data upon which the report will be based will be drawn from the planning surveys that have been made by the various states.

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New York Studies Control Of Road Tax Diversion

A constitutional amendment which would prohibit the diversion of more than half of highway tax revenues to other than highway purposes has been favorably reported to the New York State Constitutional Convention now in session, by its committee on highways. The measure, however, has been attacked by the Committee on Finances.

The proposed amendment was also strongly attacked by Governor Lehman in a special message to the convention. The governor took objection to the entire principle of earmarking tax revenues, and said that it might necessitate increasing taxes.

The proposed amendment, which would have to be passed on by the people of the state if adopted by the constitutional convention, provides that the revenue from any motor fuel tax of two cents a gallon or less or half the revenue from any motor fuel tax, whichever is greater, plus all the revenue from other highway user's taxes, be deposited in a highway fund and used solely for highway purposes. The amendment would also permit grants to local governments for highway construction and maintenance.

Urge Park Development On Jamaica Bay

New York Park Commissioner recommends industrial zoning of Bay area be eliminated

Abandonment by New York City of a plan for industrial development of Jamaica Bay, an arm of the Atlantic Ocean on the south side of Long Island, and substitution of a program for developing the bay area as a park and residential site, has been proposed by Park Commissioner Moses in a report to Mayor LaGuardia.

A plan to transform Jamaica Bay's 18,000 acres of water, marsh and meadow land into an industrial port and ship terminal was incorporated into the city plan in 1922. It was proposed to blot out the water and marsh land in the bay by two large islands approached by a system of navigation channels bordered by industrial piers and wharves.

Nothing has been done since that time, the commissioner points out, to carry out this plan, but on the contrary a considerable recreational and residential development of the bay area has taken place. In the Jamaica Bay neighborhood are the reconstructed Jacobs Riis Park, the new Marine Parkway Bridge, the improved Cross Bay Boulevard, the site of the proposed Rockaway Beach rehabilitation, the new Marine Park, and the Circumferential Parkway, as well as Floyd Bennett Airport.

"The conflict between the deflated industrial plan of 1922 and the residential and recreational program of 1938 is basic and irrepressible," said the commissioner. "The industrial plan of 1922 if persisted in will never be successful, but it will ruin Jamaica Bay for housing and play. . . .

"The plan for the industrial development of the bay now on the city map should be scrapped. It offers an irresistible incentive to all sorts of undesirable schemes," such as the recent proposal by the city department of sanitation to use Jamaica Bay as a dumping area, over which much controversy has arisen.

As an alternative to the industrial development plan, the commisstoner proposes a complete re-zoning of the bay and its surrounding area, so that city land now set aside for industry could be zoned for residential and recreational use, with the exception of two areas reserved for industrial development. All islands would be transferred to the park department for recreational use; meadow land adjoining the cross bay boulevard would be dedicated to public use after 1945, upon the expiration of an existing lease held by real estate interests. Finally, the polluted waters of the bay would be purified in accordance with the comprehensive sewage disposal plan of the city department of public works.

The existing channels in the bay are stated to be adequate for motor launch navigation with the exception of a short section which should be dredged to a 10 ft. depth at a cost of about $200,000.

"Our inheritance at Jamaica Bay is too precious," the commissioner concluded, "our investment, present and prospective, in parks, parkways and recreation on its borders is too large to jeopardize them by indifference and bad judgment. We talk a great deal about city planning. What we need in this context is a little common sense."

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Pacific Coast convention, Portland, Aug. 9-12.

INTERNATIONAL CONGRESS FOR INDUSTRIAL ACCIDENTS AND OCCUPATIONAL DISEASES, Frankfort-on-the-Main, Germany, Sept. 26-30.

LOCAL AND REGIONAL

WESTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual convention, Reno, Nev., Aug. 10–13.

AMERICAN WATER WORKS ASSOCIATION, Central States Section, Hotel Windsor, Wheeling, W. Va., Aug. 17-19; New York Section, Nelson House, Poughkeepsie, N. Y., Sept. 22-23.

NEW ENGLAND WATER WORKS ASSOCIATION, annual convention, Hotel Statler, Boston, Sept. 13-16.

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Examinations

IOWA examinations for professional engineering, Sept. 13-14 in the Senate Chamber at the State House, Des Moines.

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Short Course

A COURSE for operators of water and sewage treatment plants will be held at the University of Maryland, College Park, Md., Sept. 12-14. The course will be given in cooperation with the Maryland-Delaware Water and Sewerage Association, the Maryland State Department of Health, and the American Water Works Association, Four States Section. Advanced work will be provided for those who have attended previous courses.

Boulder Power Contract Is Modified

Firm power from Boulder Dam having become available on July 1, two years ahead of schedule and before the Metropolitan Water District of Southern California is ready to make use of it on the Colorado aqueduct, Secretary of the Interior Ickes on July 14 signed a contract revising the terms of the original contract by which the district was to buy stipulated amounts of power as soon as it became available.

Under the new contract the date on which the district is required to take power is extended from June 1, 1938 to June 1, 1940, and the district is given 15 years thereafter before being required to take a full 36 per cent of the total power available from Boulder Dam.

The district is not relieved of any payments under the new contract. Instead the difference during each month between what the district would have been required to pay under the original contract and what it actually pays will be charged as a debt of the district, with interest at 4 per cent. The amount of the debt will be reduced by any proceeds received from the sale of power which the district contracted for but does not take. Beginning in 1955, the district must retire the debt with interest so that it will be entirely paid off by 1937.

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Early Start Planned On Morganza Flooding

With the $31,000,000 appropriated at the last session of Congress for flood control on the lower Mississippi river now available, the Corps of Engineers expects to proceed as rapidly as possible in the acquiring of flowage rights for the Morganza floodway. If the property owner agrees to accept a figure which the engineers regard as reasonable, actual payment will be made as soon as titles to the land desired can be approved.

Since the floodway itself can not be used until the Wax Lake outlet is ready, that part of the work will control the date at which the new floodway can be put in operation. As it will take longer to complete the outlet than it will to build the control works and construct the additional guide line levees needed, every effort will be made to speed up the work on the Wax Lake part of the project.

Work will be started as soon as possible, it was stated by the Corps of Engineers, to raise the necessary bridges and on preperations to build up the Point Coupee fuse plug.

First U.S.H.A. Project Gets Under Way

Earth is turned for Red Hook housing project in Brooklyn, first to start under new program

The first actual construction work on the housing program being administered by the U. S. Housing Authority got under way July 18, when a steam shovel operated by Mayor LaGuardia of New York City turned the first earth for the Red Hook housing project in Brooklyn, one of two new projects in New York City which will cost a total of $33,667,000 and house 6,000 families.

The 30-acre Red Hook project will consist of 2,643 apartments containing 10,865 rooms in six-story elevator buildings. Chief architect on the project is Alfred E. Poor; director of construction is Allan S. Harrison; and substructure contractors are Poirier & McLane of New York City.

The full amount of the funds originally provided for the U. S. Housing Authority program was earmarked July 15 when $77,370,000 was set aside, bringing the total earmarkings to $504,000,000. Money still remains to be earmarked, however, since the last session of Congress increased the housing fund to $800,000,000.

Larger earmarkings in the latest group include $23,000,000 for New York City, bringing the funds set aside for that city to $53,000,000; $15,000,000 for Boston, which has already received $9,000,000; $4,500,000 for Hartford; $2,500,000 for Orange, N. J.; $1,500,000 for Holyoke, Mass.; $3,200,000 for Akron; $3,000,000 for Dayton; $3,600,000 for Toledo; and $3,000,000 for Pittsburgh.

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New York City Lends Funds To Housing Authority

The first step in New York City's municipally-financed housing program, which is to be carried out by the New York City Housing Authority in addition to its federally aided program (*ENR*, June 30, 1938, p. 891), was taken last week when the New York City Board of Estimate authorized the city to purchase land in Manhattan for a housing project.

The housing authority will reimburse the city for the cost of the land when it floats an impending bond issue which is to be repaid from the proceeds of the new occupancy tax on rented property, just introduced by the city.

The Board of Estimate decided to purchase the land because the Housing authority holds options to purchase about 90,000 sq.ft. of land in the lower East Side of Manhattan for about $300,000. These options were about to expire, and it was felt that if they were not taken up the authority would have to pay much larger sums later.

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Health Service Asked To Study Epidemic

To settle a controversy between the Wisconsin State Board of Health and the Milwaukee Board of Health over the cause of a gastroenteritis epidemic last February and March (*ENR*, Feb. 24, 1938, p. 286; May 19, p. 701), the U. S. Public Health Service has been called in. The State Board has made the request for a study to determine the cause, and the city officials have concurred in that request.

The city health commissioner contends that the epidemic was probably air borne, and state officials indicated that water was probably the cause in a recently completed report.

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Grade Crossing Cost To Railroads Cut

Railroads in New York state, which are now required to pay 50 per cent of the cost of eliminating railway-highway grade crossings, would have to pay not more than 15 per cent under the terms of a constitutional amendment adopted by the New York State Constitutional Convention now in session. The amendment, having been adopted by the convention, will be submitted to the voters in the fall.

The proposed amendment would require that the railroads pay for grade crossing eliminations on the basis of the benefits they received from projects, up to a maximum of 15 per cent of the total cost. The railroads will continue to pay the entire cost of incidental improvements of value only to the railroads, but they will pay no part of incidental highway improvements.

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Paving Assessment Basis Changed in New Orleans

Cost of street paving work in New Orleans will be assessed to abutting property on a square footage basis rather than on a front foot basis as formerly under the terms of an amendment to the street paving law signed by Governor Leche on June 22.

A second bill signed by the governor authorizes the city to issue paving certificates to be redeemed by assessment against abutting property, to be used to pay the cost of materials and equipment on WPA street paving projects.

Housing Laws Upheld In Two States

Louisiana and Pennsylvania supreme courts uphold legality of local housing authority acts

Basic principles of local participation in the federal housing program have been upheld by the supreme courts of Louisiana and Pennsylvania. This brings to six the number of states in which high courts have passed upon state housing acts; local housing authority laws were upheld in Kentucky and New York before the passage of the U. S. Housing Act, and the supreme courts of Alabama and North Carolina have passed upon similar statutes since the passage of the act.

Louisiana decision

In a test suit brought by the attorney-general of Louisiana, the state Supreme Court held that a city may lawfully contribute or lend funds to a local housing authority for preliminary or organizational expenses and may purchase bonds from the local authority. In so doing, the court held, the city is performing indirectly a primary municipal function. The city likewise may vacate streets within the area of a housing project and sell them to the local authority.

Property of local housing authorities is public and is exempt from taxation under the state constitution. A local authority has the right to exercise the power of eminent domain. Debts of the local authority, moreover, are not debts of the municipality, and the housing authority is not a municipal corporation and is not subject to the debt limitations imposed on municipalities by the state constitution, the court held in its decision.

Pennsylvania case

Deciding a case brought by a taxpayer against the Philadelphia Housing Authority and the City of Philadelphia, the Pennsylvania Supreme Court upheld the legality of the local housing authority on substantially the same points as the Louisiana decision. In addition, the Pennsylvania court held that the housing authority law does not involve any delegation of legislative powers.

The high court held that housing authorities do not constitute special commissions within the meaning of the provision of the state constitution which prohibits the General Assembly from delegating to such commissions any power to perform any municipal function or interfere with any municipal improvement, money, property or effects.

Lock Blowout Kills Worker On Memphis Sewer Tunnel

A lock tender was killed and thirteen sandhogs were given a bad jolt when the top door of a shaft lock blew off Monday afternoon, July 11, on a section of compressed-air sewer tunnel in Memphis being driven by the Nolan Construction Co., of Detroit. Full details of the accident have not yet been received from the job, but apparently the top door of a vertical lock near the foot of an 85-ft. shaft at Front and Calhoun Sts. let go just as the locktender was closing the bottom door. The tender, inside the lock, was thrown against the top and killed.

Thirteen workmen in two headings extending each way from the bottom of the shaft were bowled over by the first outrush of air, carried at 31 lb. per sq. in., but the bottom door apparently slammed shut soon enough to prevent loss of all the air in the headings. It was necessary, however, to release the air before the men could be let out of the tunnel.

The lock was repaired and air restored on July 14. Press reports state the tunnels were found partly full of sand and water. The two headings, each 7 ft. 10 in. inside diameter, had advanced about 90 ft. from the shaft, and concrete lining was carried within 6 ft. of each face.

OBITUARY

JOHN L. W. BIRKINBINE, mining and civil engineer and senior partner in the Philadelphia firm of Birkinbine Engineering Offices, died in Philadelphia July 17 at the age of 61. Birkinbine had done work in the Southwest and in Mexico on railroad, irrigation and water power projects.

ALFRED W. RUPLE, 74, for many years a civil engineer for the old Cleveland and Pittsburgh Ry., died in Cleveland July 6.

WILLIAM SCRUGGS, retired highway contractor and formerly a member of the firm of Hudson & Scruggs of Wilmington, N. C., died in Atlanta July 11.

ROBERT L. MILLER, 24, Seattle construction engineer, died in San Francisco July 8.

A. FREDERICK OBERLIN, for 20 years assistant town engineer of Hamden, Conn., died there July 10 at the age of 47.

CAPT. JOHN K. ROBISON, U. S. Navy, who had practiced in New York City as a consulting engineer since his retirement from the Navy in 1926, died in New York July 14 at the age of 67. Capt. Robison was chief of the Navy Bureau of Engineering from 1921 to 1925 with the rank of Rear Admiral.

ARTHUR S. LANE, vice-president of the Lane Construction Co. and president of John S. Lane & Sons, died July 7 at Meriden, Conn., aged 73. Lane entered the construction industry in 1891 when he became a partner with his father in the crushed stone business at Meriden. When the firm began to expand into the roadbuilding field, the Lane Construction Co. was formed in 1902 to take over the roadbuilding work, and Lane became treasurer of the corporation, a position he held until last year.

NOAH JOHNSON, for 34 years valuation engineer for the Wabash R.R., died July 9 in Decatur, Ill., at the age of 69. Johnson graduated in civil engineering in 1894 from the University of Minnesota.

ROBERT R. ELLIOTT, a construction engineer formerly connected with the Kentucky highway department, died at Owensboro, Ky., July 6 at the age of 43. Elliott was a graduate of the University of Kentucky.

MONROE D. BAKER, 79, Rochester, N. Y., civil engineer, died there July 13. Baker graduated from the University of Michigan in 1886. He practiced as a member of the firm of A. M. Baker & Sons, founded by his father.

GEORGE P. JAMES, 70, Seattle civil engineer, died there July 14. James was for many years chief engineer of the Seattle street car system and was president of the Olympic Construction Co. and the Queens City Construction Co., water supply and paving contractors.

JOHN H. GRIFFITH, for many years associate professor of theoretical and applied mechanics at Iowa State College, died July 14.

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Kansas Contractor Denied Pay for Extra Rock

The Kansas State Supreme Court has refused to award additional payment to a highway contractor who encountered more rock in an excavation contract than was contemplated in the specifications. The court affirmed a decision by the Shawnee County district court denying the Scherrer-Bennett Construction Co. of Kansas City the right to collect from the state highway department.

The court held that the fact that the disputed excavation was awarded as unclassified material superseded the estimate in the specifications of the amount of rock to be expected.

LABOR NOTES

ALL BUILDING TRADES workers on city projects in St. Louis, Mo., were called out on strike July 12 by the Building Trades Council there. Primarily in sympathy with a strike of city employed hoisting engineers (*ENR*, July 14, 1938, p. 40), the strikers also sought an increase of a dollar a day for city laborers now receiving from $3 to $5 per day and the employment of union plumbers on city work. The Brotherhood of Electrical Workers was expected to call out its members within a few days in support of the building trades workers.

ELECTRICAL and construction workers at the New York World's Fair returned to work, July 19. Building trades workmen had walked out (*ENR*, July 7, 1938, p. 8), in support of a demand by the Brotherhood of Electrical Workers that they be allowed to lay certain telephone cables being handled by the telephone company's own forces. Terms of the strike settlement were not announced.

COMMON LABOR at Anchorage, Alaska, won a raise in wages from 75 to 82½ cents an hour after a strike against the MacDonald Construction Co. of St. Louis which holds the contract on a school and a hospital project.

AN INCREASE in wages from 40 to 70 cents an hour is sought by striking hodcarriers on a high school project being built by the Manhattan Construction Co. at Tulsa, Okla.

• • •

Seattle Engineer Forces To be Reorganized

Reorganization of the city engineering department is provided for in the 1938 budget ordinance now being considered by the Seattle City Council. Under the proposed reorganization E. French Chase, chief sanitary engineer of the city, would be retired from active duty and Oscar A. Piper would be transferred from the position of principal city engineer to take the duties of an assistant engineer. The reorganization proposals were drawn up by new city engineer Charles L. Wartelle and Mayor Langlie.

The city will be divided, if the program is adopted, into a northern and a southern district for supervision of engineering work. Piper will be placed in charge of one of the districts, at his present salary, and I. W. Imbury, assistant engineer in the department, will have charge of the other district.

COMMENT AND DISCUSSION

Readers' opinions on matters that concern the engineer

Trouble With Brickwork

Sir: Reading James A. Munroe's letter in the June 9 issue, p. 803, on the subject of trained bricklayers, I am prompted to pass on to him some of the things that have passed before me in the past ten months.

When the matter of trouble on the housing projects came to public notice, I was in the midst of endeavoring to place the cause of much of the efflorescence which we see on brick and stone mason work. After inspecting some fifty odd cases in this area and in others, I concluded that this was tied up in the three items listed herewith and in their respective positions.

1. Design
2. Workmanship
3. Materials

Much of our trouble with brick mason work is being caused by the designer in his efforts to reduce cost by making substitutions. One example is the use of face brick with back-up tile. There are many others.

But back to the Locke Field Apartments. If the trouble here was the same as on others with which I had contact it is entirely one of design and can easily be corrected in future construction.

As to trained bricklayers. We have trouble in brick mason work even with the best of the mechanics and until we have designers and inspectors with courage we will continue to have trouble. The best workman will only give you what the speed of the job, the design and inspection demand.

CHAS. L. KIRK,
Vice President
Eddystone Portland Puzzolan Cement Co.
New York, June 13, 1938

Velocity Head Correction

Sir: In an article in the Engineering News-Record, Aug. 16, 1934, p. 214, entitled "Velocity-Head Correction for Hydraulic Flow," by Morrough P. O'Brien and Joe W. Johnson the method proposed for computing the correction factor involved the use of lines of equal velocity, properly called isotachs. Since these lines were drawn at uniform intervals of velocity, the areas between the lines varied.

The theoretical treatment involves the use of differential areas, and in the authors' solution it is assumed that the use of the varying small areas between isotachs is a reasonable approximation to a uniform differential area. A method believed to be more accurate and equally applicable, especially if the observed velocities are uniformly distributed across the cross section, is to divide the area, A, by the number of observations, n, and use this for the differential area. $V^3 \frac{A}{n}$ is then an approximate solution for the expression $\int_0^A v^3\,da$ and approaches an exact solution as n increases. Then the authors' equation (4)

$$\alpha = \frac{\int_0^A v^3\,da}{V_m^3 A} = \frac{\frac{V^3 A}{n}}{V_m^3 A} = \frac{\frac{V^3}{n}}{V_m^3}$$

is the ratio of the mean of the cubes of the several velocities to the cube of the mean velocity.

Where the velocity observations are not taken in areas of equal size the error involved should be of the same order as that involved in the authors' planimeter method.

R. EVAN KENNEDY,
Denver, Colo., May 23, 1938

Flood Gate Design

Sir: In my article entitled "Flood Gates Protect Manufacturing Plant" (*ENR*, June 9, p. 820), it is stated that the "Designs for the structures were by Charles E. Ryder, Chief Engineer, Department of Forests and Water." This sentence should read, "Designs of the structurers were *approved* by Charles E. Ryder, Chief Engineer, Department of Forests and Water." It is also stated that the trash racks were constructed of 14½-in. bars whereas this should read "1½-in. bars."

J. E. WEBSTER
General Works Engineer
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

"Design for Speed"

Sir: I have been away and have just seen the editorial in your issue of March 17th entitled "Design for Speed". Your comments are stated to be based on discussions which took place at the meeting of the Highway Research Board at Washington in December of last year.

I do not think, however, that you present a correct picture of the trend of thought at the meeting in the matter of "Speed" as affecting highway design. Your advocacy of design for speeds in excess of 60 m.p.h. is not, I think, in accord with the arguments advanced at the meeting.

I have noted also the editorial in your issue of April 28th which describes the excellent road work being done in Montana. In this note you say "they (in Montana) are doing it with such remarkable success that road travel at 60- and 70-mile speeds is easy and safe and common."

That it is easy to drive a modern car over almost any good road at 60 or 70 m.p.h. no one can dispute and Montana has no monopoly of such roads. That it is safe to drive at such speeds I do not believe, not because the car cannot be driven at that speed, or that the road does not permit that speed, but the average human being who drives a car cannot drive "safely" at that speed—safely either for himself or for other users of the highway.

Our greatest highway problem today is not building roads out in the open but the relief of congestion. Where there is anything like dense traffic, speeds in excess of 45 m.p.h. should be and are prohibited by law, and it is entirely impractical to drive at speeds higher than this on roads with heavy traffic.

I do not believe that many thinking engineers of experience believe there is any "factor of safety" per se in designing roads for traffic speeds in excess of those speeds at which it is safe for the ordinary driver to drive.

I believe advocacy of such criteria of design is not good engineering inasmuch as it ignores the limitations of the driver, limitations which are not going to be changed soon.

F. LAVIS
New York, N. Y.,
June 24, 1938

ENGINEERING NEWS-RECORD

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Editorial Offices at 330 West 42nd Street, New York

JULY 21, 1938

BRIGHTLY-PAINTED road signs impress the traveler with good highway housekeeping. Generally they go with well-kept surfaces and neat roadsides. What does not appear to the traveler is the repeated labor and expenditure that such a road marker represents: its amount is large enough that in the course of only a few years the road sign paint shop has grown to be a substantial factory, directed by paint experts and equipped with special machinery for its work. Together with this transformation has come the beginning of a study of production economics, as represented in the practice of the Iowa department. In a brief period painting costs in one highway district have been reduced almost two-thirds, with only a third of the shop capacity utilized. The next step in lowering costs is likely to be quantity production —not a simple problem of centralization, since it must be combined with rapid replacement service. The necessary central stocking of spare signs and their prompt delivery, a task calling for unusually able management, is a profit-tempting field for the maintenance engineer to explore.

The New "Swimmin' Hole"

THOSE WHO MOURN the passing of the "old swimmin' hole" should dry their tears, because the youngsters of today are probably having a much better time—at least a safer one—in the numerous pools that have supplanted it. The modern swimming pool may not have a graceful willow overshadowing it, but it does have compensating facilities and supervision. For this thanks are due our state health officials, who are aggressively and effectively protecting the public interests at bathing places. As exemplified by the well-developed Illinois program described on p. 78, routine inspections, observation of operating reports, and analysis of facilities by sanitary engineers, give assurance that pools are meeting adequate hygienic requirements. And capitalizing on the idea that competition is keen and people are quality-conscious, the health department issues classification certificates which establish the sanitary rating of each pool. The desire for a rating higher than the minimum standard is a further stimulus to improvement. It is the intelligent application of regulatory measures of this kind that insures the safety and popularity of the new "swimmin' hole".

New Traffic Solution

NO PARKWAY OR FREEWAY has ever been regretted. Relatively new as a road type, the grade-separated divided-lane highway has met with immediate approval wherever it has been tried—in New York, Washington, Philadelphia, St. Louis and Connecticut. Against such a background Los Angeles now embarks on freeway building after trying to meet its traffic problem with wider and wider and ever more expensive boulevards on which vehicle flow is controlled by lights. No more promising area for such trunk roads, unless it be Detroit, exists in the country than the Los Angeles metropolitan region. Here 40 per cent of California's motor vehicles battle one another daily as they serve 80 per cent of the daily transportation requirements of Los Angeles County. Free and continuous flow from the center of the city outward is the objective sought. The new parkway up the Arroyo Seco to Pasadena, described in this issue, is the first step. As the latest traffic trunk in the country, it should be the best; it deserves study as a current model of arterial road design.

Settlement Pressures

AN INTERESTING test of the settlement loads that backfill exerts on buried tie rods during its consolidation is described this week. The results do not claim to be more than an indication of what may be expected under one set of conditions, and their use elsewhere must, of course, be guided by careful judgment. But they command attention because of the woeful lack of previous information on the subject. Engineers have had to rely solely on crude observation in estimating the action of moving earth masses, whether in slides or in settlement, and the busy students of soil mechanics, being fully preoccupied with statics, have had neither time nor equipment to take up the study of dynamics. The present report is only a starting point; its initial data must be supplemented by many others before directly useful conclusions can be drawn, for in this difficult field no single investigation can do more than bring out a few isolated facts. But the cumulative information from many tests will soon form a valuable body of knowledge to guide engineering practice. Of necessity, most of such tests will have to be made as the day's work goes on, to give a basis for quick decision on design or construction procedure; this means that, like the present test, they will have to depend on improvised apparatus, under the further handicaps of lack of time and laboratory training. But even though the results of such

work may seem to be disappointingly small, each will add to the stock of data that eventually will give us more precise knowledge.

Two Kinds of Inspection

INSPECTION OF MATERIALS and construction in civil engineering work is traditionally looked upon as a unit responsibility, serving the one purpose of assuring the desired degree of excellence in the finished structure. In shop manufacturing, on the other hand, two kinds of inspection are often recognized. In a recent paper C. L. Bausch points out that inspection of the final product should report to the executive or engineering department, while inspection of parts may properly be placed under the production department, as is done at the Bausch & Lomb Optical Co. works. The underlying principle is that "final inspection should represent the viewpoint of the customer, while it is often advisable for the parts inspection to have the viewpoint of the manufacturing department." This reasoning may have application to construction as well. Many questions that arise in the course of assembly of material and parts are of principal concern to the construction department. Inspection from the viewpoint of service of the finished structure usually rests on quite different criteria.

Continue the Work

GOVERNMENT ANNOUNCEMENT that more than 3,000 grade crossings have been eliminated under the federal program in five years is important news, but less because of the actual progress made than because it is a reminder of the size of the problem involved. Tens of thousands of dangerous grade crossings await correction.

Since the unprotected grade crossing remains the greatest hazard to both road and rail efficiency, the work of elimination should continue under an active program. But for this purpose it is necessary to face facts, primarily the fact that today neither railroad earnings nor capital can finance such work, and that public financing will be necessary. Recent discussions in the New York State Constitutional Convention show that this situation is recognized by many thoughtful men, but has by no means won general acceptance.

Unfortunately the relation of the subject to highway fund diversions has had scarcely a mention; yet the fact is that the current diversions by New York State alone would support a most substantial grade-crossing elimination program, to the benefit of rail and road traveler alike. In due course this fact will undoubtedly come to be recognized. But until then it calls for continued work to oppose road-tax diversions as unfair class taxation, and as a serious setback to progress in grade-crossing elimination.

World's Fair Effects

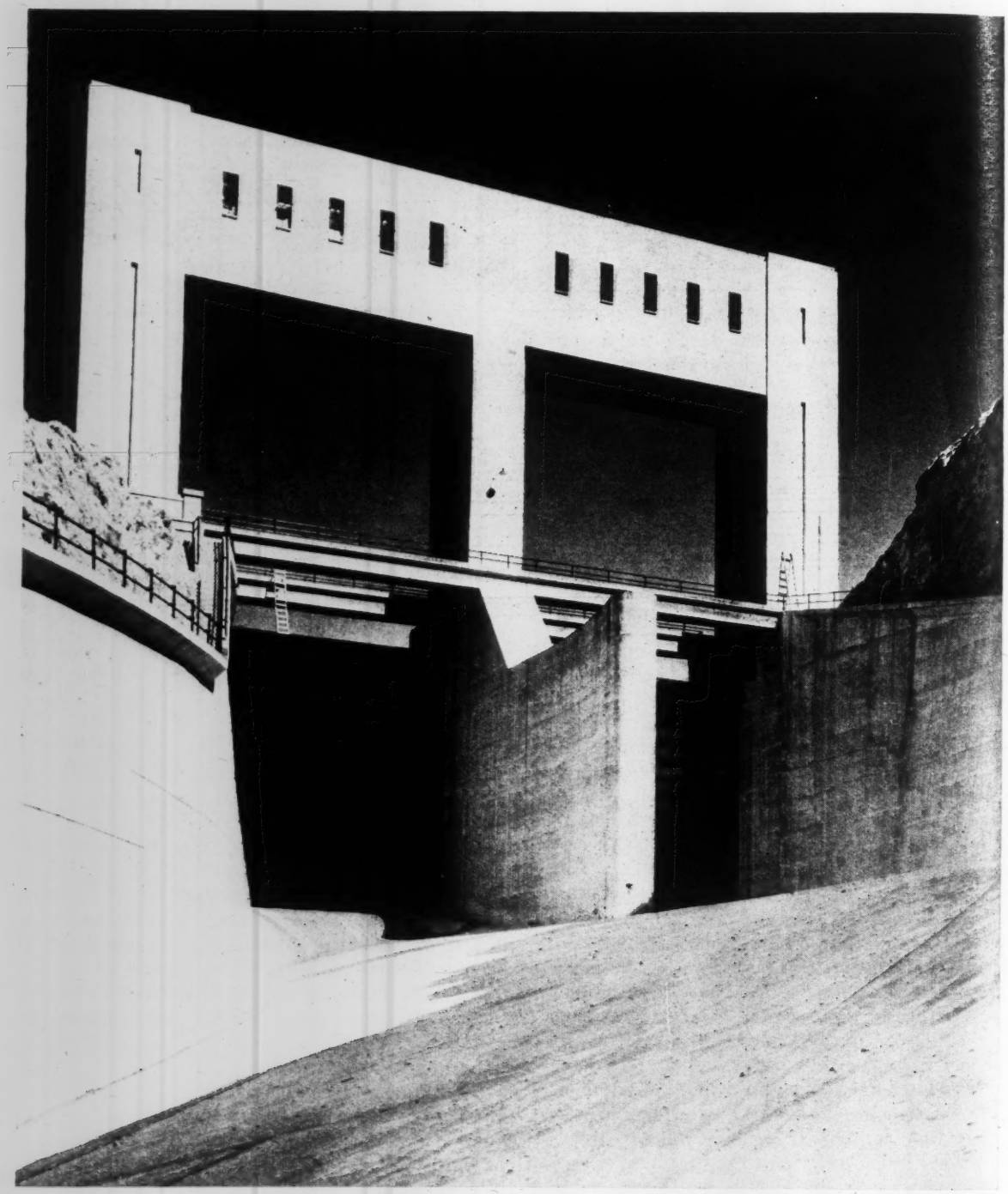
JUST HOW MUCH the unusual structures that are built for each new world's fair influence general building practices is a moot question. Yet the possibility of such influence on architecture and structural design is usually listed on the asset side of each world's fair ledger. Modern expositions, no doubt, take their cue in this respect from the Philadelphia and Chicago fairs of the last century, which unquestionably promoted steel framework in the one case and classical architecture in the other. Today, however, because people travel more and thus are not so easily impressed by world's fair wonders, it is more difficult to ascribe definite influences to any single exposition.

Looking back only to the Chicago Century of Progress Exposition of five years ago, one can remember the mechanized modernistic homes, the circular building with its roof suspended from cables, the large exhibit building with its arch ribs exposed to the outside, the transporter suspension bridge and the unusual mass effects of some of the buildings. Most of these novelties found some later application although none has exerted any widespread influence. Still, they must have stimulated engineering and architectural thinking.

Next year, fairs in San Francisco and New York will attempt to carry on this tradition. Already interesting structures have been built or planned, such as a building of three-hinged arches for the Golden Gate Exposition in which the walls act as counterweights to offset arch dead load and to decrease stresses in the central part of the span. At New York a framed sphere 180 ft. in diameter has just been completed which presented some unique structural problems, and announcement has been made of a 132-ft. stainless-steel hemisphere to be supported by exposed arch ribs. Unusual forms, still more unusual color combinations, and also new uses of materials, will no doubt characterize the structures still to be built.

The world's fair is basically a carnival and a circus, and many of its buildings are as rococo as hot dog stands and not much more significant architecturally or structurally. But because of the complete freedom given the designers of exposition buildings and because modern fairs utilize the services of many of the most able engineers and architects, there is always a real chance that something elemental and fresh will result. As a proving ground for ideas, as a laboratory for new materials, world's fairs offer constructive possibilities.

PICTURES IN THE NEWS



Bureau of Reclamation Photo

NEW SPILLWAY FOR MORMON FLAT DAM on the Salt River irrigation project near Phoenix, Ariz. Recently completed, these two 50x50-ft. regulating gates discharging into a 450-ft.-long curved and superelevated channel take the place of an old spillway and nine radial gates which were set at such a sharp angle to the flow as to cut down discharge capacity to only 60 per cent of its design figure.

Suspension Bridge for Water Pipe

ROBERT SAILER
Engineer, U. S. Bureau of Reclamation, Denver, Colo.

A 360-ft. catenary carries irrigation water across the mouth of Ogden River canyon in Utah in a 31-in. diameter steel siphon

As PART of the Ogden River project of the Bureau of Reclamation, the South Ogden highline canal was constructed to supply water for irrigation purposes to the lands near Ogden, Utah. A 31-in. steel siphon, crossing the Ogden River canyon, provides the connection between the canal and the Ogden conduit, which, running along the northerly rim of the canyon, brings the water out of the reservoir impounded by the Pine View Dam (*ENR*, Jan. 6, 1938, p. 15). To carry the steel siphon across the canyon a unique catenary suspension bridge was built, hanging 160 ft. above the riverbed and anchored in the walls of the canyon. Fig. 2 shows the profile of the siphon and the canyon crossing.

Several preliminary studies were made to determine the most economical structure for this crossing. Investigations were made and estimates prepared for carrying the siphon to the bottom of the canyon, crossing underneath the railway and highway, and bridging the Ogden River on two short spans. Another study was based on the use of a 260-ft. steel arch bridge with concrete skewbacks set in the solid rock of the canyon walls. The suspension bridge proved to be most economical and offered least exposure to falling rock.

The profile of the site was such that satisfactory vertical alignment of the siphon was obtained using a suspension bridge without towers and a bridge floor fastened to the cables without hangers. The large deflections which occur in cable suspension bridges imposed many unusual requirements on the design. It was of prime importance that ample flexibility be provided in the steel pipe and floor system for expansion, contraction and rotation. Since these movements would be concentrated at the panel points, fairly close spacing of the floor beams was required in order that the movement at each point would be small.

Pipe connections

Special sleeve couplings with rubber gaskets provided the necessary flexibility and allowed straight pipe sections 20 ft. long to be used. Each section of pipe is supported midway between couplings by a floorbeam. Having the sections supported at one point only, movement at the joints allows the pipe to follow the changing shape of the catenary while filling and emptying the siphon. With this type of support it was considered possible that unequal

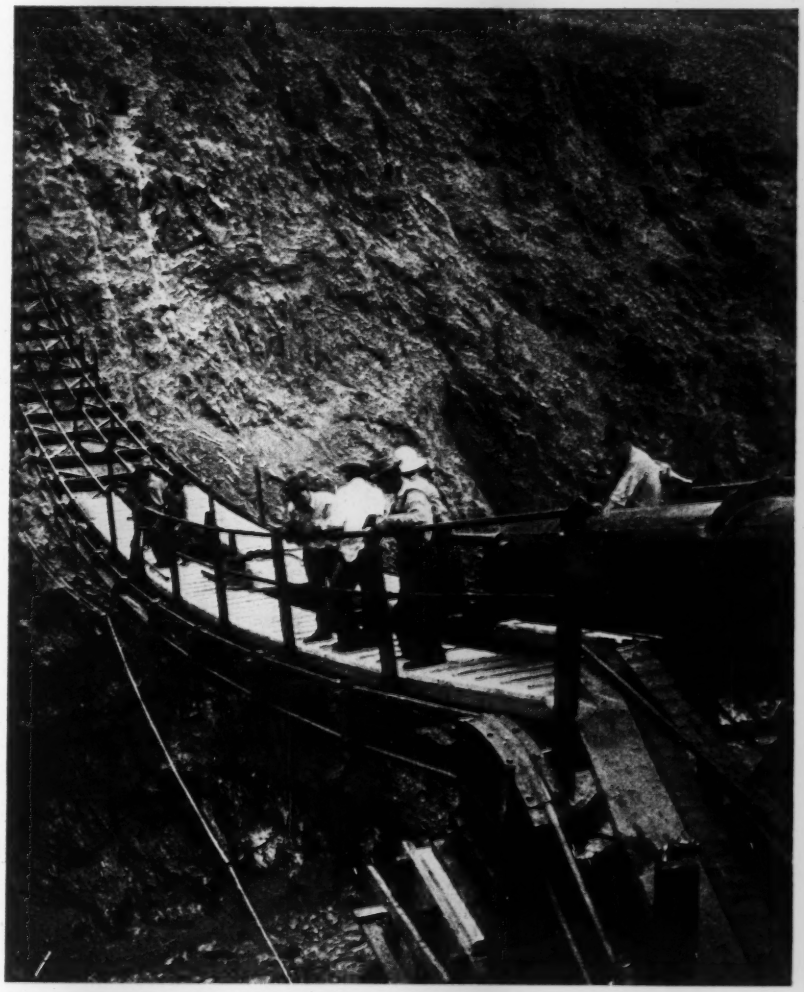


Fig. 1. Ogden Canyon pipe siphon is carried on four 1½-in. cables.

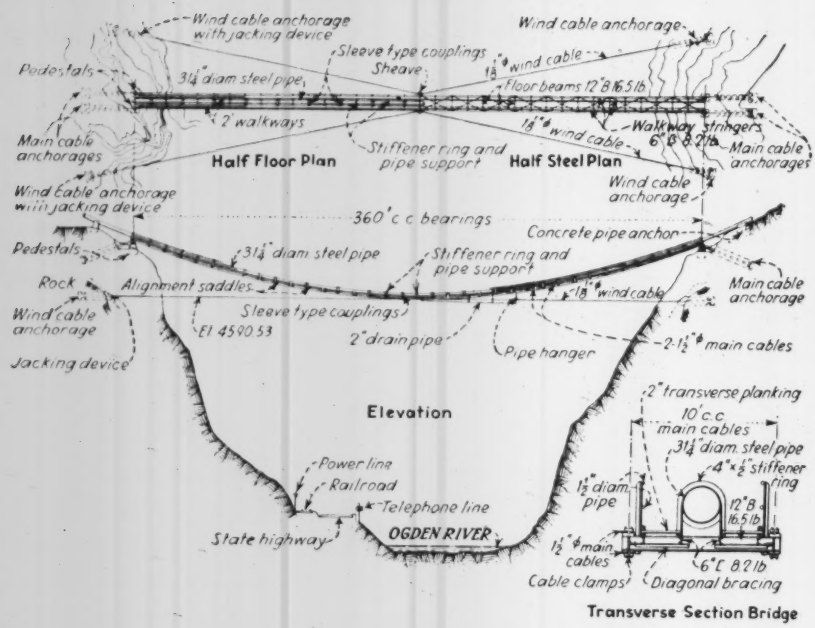


Fig. 2. Structural details of the bridge floor and pipeline. The bridge was built with the aid of an overhead cableway.

friction in sleeve joints might cause the pipe to creep out of line. To prevent this movement alignment saddles supported on the stringers were located on each side of the couplings. Under normal conditions the saddles will clear the pipe by ¼ inch.

Although the beams for supporting the pipe were spaced 20 ft. apart it was desirable to use intermediate beams to support the walkway stringers. These stringers are framed to the beams at one end and rest on seat angles at the other end to allow longitudinal movements. Such provision was essential because the elongation in the main cables due to water load amounts to ⅛ in. for a 20-ft. panel.

The ends of the floorbeams are clamped at the top and bottom flanges to the main cables, using eight bolts for beams which carry the pipe and four bolts for intermediate floorbeams. The main cables, two on each side, are 1½-in. high-strength bridge strands, with an allowable working strength of 70,000 lb. per sq. in. Small saddle castings transmit the vertical load from the cables to short concrete pedestals near the rim of the canyon. Open bridge sockets connect the ends of the cables to the steel anchorages.

Exposure conditions being severe, and with the main cables only 10 ft. apart, it was apparent that adequate lateral rigidity could not be provided by bracing alone and that wind cables would be necessary. A study of the topography indicated that satisfactory anchorage could be obtained by using an angle of 12 deg. between main and wind cables. The effectiveness of the lateral support furnished by these cables depends upon the initial tension, which is affected by temperature changes. With a wind load of 50 lb. per sq. ft. on flat surfaces and 30 lb. per sq. ft. on the pipe diameter, a total stress of 69,000 lb. could be produced, requiring 1⅛-in. cables.

The diagonal bracing between the main cables was designed as a two-span continuous system, for which the pedestals provide rigid supports at the ends and the wind cables provide a yielding support at the center. It was interesting to note that the stresses calculated on the basis of this yielding center support differed by only a small amount from the stresses calculated on the basis of an unyielding center support. In designing the intersection of the diagonals proper allowance was made for the flexibility of the cables by using a sliding joint at the intermediate floorbeams.

With the pipe empty it was found that wind may produce compressive stresses in the main cables of sufficient magnitude to overcome the tensile stresses due to the load of the empty pipe, at the center of the span and near the quarter points. At these points angle struts were placed between the floorbeams to carry compressive stresses. At one end the struts were riveted to the lateral plates and at the other end a sliding connection was provided. Before filling the pipe the ends of the struts at the sliding connections were brought to bear against the webs of the crossbeams, proper adjustment being obtained by the use of steel shims. With the pipe full, the distance between the floorbeams increases by the amount of the elongation in the cables due to water load, and the ends of the struts are no longer in contact, making the struts ineffective for the transfer of a thrust. However, for this condition, the water load is sufficient to overcome compressive stresses in the cables due to wind, and the struts are superfluous.

Construction

The siphon and bridge were erected by means of an overhead cableway which was anchored near the high points of the steel pipe. Tunnels 3 x 5-ft. in section extending 21 ft. back from the vertical rock surface were blasted out of the rock and widened at the ends to form the anchorage chambers for the bridge cables. Due to the slightly fissured rock this depth was desirable to engage sufficient mass for the anchorage. After placing the anchorage steel, the chambers were concreted.

The main cables were pre-stressed in the shop and were socketed to a specified length under specified stress which corresponded to the stress in the structure for dead load exclusive of the steel pipe. This load condition was chosen because the structural steel was adjusted and riveted prior to the placing of the steel pipe. The cables were shipped on reels, unloaded on the skip of the cableway, fastened at one end with open bridge sockets to the anchorage steel and unreeled as the skip was moved across the canyon. The steel floor system and walkways were erected before the wind cables.

To insure proper initial tension in the wind cables, a jacking device was provided at both north wind-cable anchorages. By means of hydraulic jacks equipped with accurate gages, a stress of 69,000 lb. was applied simultaneously to each cable. Before releasing the jacks this load was per-

manently transferred to the anchorages by tightening nuts on the two 1¼-in. anchor bolts. The sheave at the center of the span permitted free movement between the bridge and the wind cables during the jacking operations. The steel pipe and couplings were placed last.

During erection, complete records were kept of the sag of the cables. Before acceptance, the siphon was tested under full water load, which made it possible to measure the deflection due to water load. In spite of prestressing initial stretch occurred. The increase in sag due to dead load alone was found to be 9 in. as compared to a calculated value of 4¾ in., based on a modulus of elasticity of 20,000,000 lb. per sq. in. In contrast, the increase in sag due to water load showed remarkable agreement; the theoretical sag increase, based on the same modulus of elasticity, was 10⅜ in. and the measured value was 11 in. for the first loading and 10⅜ in. for the second test, made some days later. It is believed that the initial stretch would have been greatly reduced had the cables been prestressed to full working load first, then socketed to the specified length under partial working load.

The construction of the siphon and bridge was performed by D. Teters and supervised by the field forces of the U. S. Bureau of Reclamation at Ogden, of which J. R. Iakisch was construction engineer. The plans and designs were prepared in the Denver office under the direction of the author and the supervision of H. R. McBirney, senior engineer of canals, and J. L. Savage, chief designing engineer. All activities of the Bureau are under the direction of John C. Page, commissioner, and R. F. Walter, chief engineer.

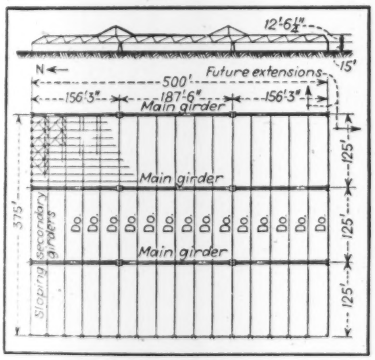
Novel Welded Framing in English Factory

A ONE-STORY FACTORY enclosing 4½ acres under a sawtooth roof requiring only four interior column supports was completed at Waltham Cross near London in February. The building is completely arc welded in shop and field and, includes a number of novel structural details.

The main load carrying elements consist of three-span 70-ton trusses 500 ft. long; one of these trusses is in an exterior wall and thus is available for a future extension of the building. Spanning between these main trusses are 4½-ton secondary trusses 125 ft. long, installed in the plane of the web members of the main trusses, and thus inclined 66 deg. from the vertical. These trusses support the north-light windows. Framing installed within the plane of the other series of web members in the main trusses consists of joists supported by the top and bottom chords of the 125-ft. trusses and carrying purlins and asbestos-cement roofing.

The 500-ft. trusses are designed to be continuous over the two interior columns, and the effective depth is increased over these supports as shown in the illustration. The interior columns are made up of four spread angle legs, while the wall columns have only two legs but are of similar design. All roof expansion is taken by bending in the end columns. The maximum load on one of the interior columns is 226 tons exclusive of wind. The total weight of steel in the structure is about 800 tons or 8 lb. per sq. ft. of floor space.

Built by Murex Welding Processes, Ltd., the building will be used for the manufacture of welding electrodes. E. F. Needham was designing engineer.



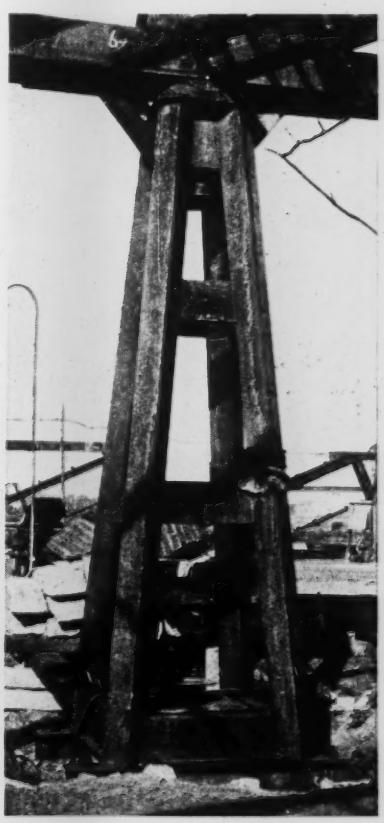


Fig. 1. Framing plan and structural details of an all-welded factory of unusual design recently completed in England.

For Safer Swimming Pools

Illinois health board is scoring outdoor pools on water treatment, facilities and operation

IN ROUNDING OUT and making more complete the swimming pool program of the Illinois Department of Public Health, certificates of classification are being issued to each outdoor pool this summer. These show the sanitary rating of each pool based upon the department's minimum sanitary requirements, which cover the four main headings, as follows: Pool facilities, bathhouse facilities, water treatment and conduct of operations.

Recognition due

During the past two years pool owners have been advised of the changes necessary to meet the minimum requirements and because of the number of improvements which have been made in many places it is felt that due recognition should be given to those pools that are trying to furnish the public with safe swimming facilities. Because of the competition which exists in this field, it is believed that this method will stimulate improvements at those pools which do not have as high a sanitary rating as others in their community.

Each pool owner also receives a detailed scoring sheet on which the rating for his particular pool is based, and thus he can determine what improvements are necessary in order to raise the rating. The issuance of this certificate, combined with a state-wide publicity program whereby the public will be acquainted with the sanitary rating and the defects at the pools it is patronizing will, it is hoped, result in the improvement of swimming pool facilities in Illinois.

Complete program

The complete swimming pool program of the department consists of routine inspections and analyses of all swimming pool facilities by sanitary engineers, close observation of operation reports, sponsorship of pool operators meetings in various parts of the state, and the issuance of a quarterly publication, the *New Swimmin' Hole*. This publication is distributed to the owners and operators of swimming pools, and discusses their current pool operation problems.

STATE OF ILLINOIS
Henry Horner
Governor

DEPARTMENT OF PUBLIC HEALTH
A. C. Baxter, M. D.
Acting Director

CERTIFICATE OF CLASSIFICATION

CLASS

SWIMMING POOL

This Certifies that the _____ SWIMMING POOL

located at _____ is given the above classification based upon requirements adopted by this department for the sanitary control of swimming pools.

CLASSIFICATION SCHEDULE	
CLASS	SCORE
AA	95-100
A	85- 95
B	75- 85
C	65- 75
D	Not approved

SANITARY RATING		
Item	Actual Score	Perfect Score
Pool facilities	___	20
Bath house facilities	___	20
Water treatment	___	35
Operation	___	25
	___	100

This certificate is in full force and effect unless revoked for cause.

In Witness Whereof the Director of Public Health has subscribed his name and caused the seal of the Illinois Department of Public Health to be attached hereto in Springfield the _____ day of _____ 193__

No. _____

_____ M. D.
Acting Director of Public Health.

Fig. 1. Certificate which is issued to swimming pool owners when their pools meet Illinois standards.

ITEMS CONSIDERED FOR ISSUING CERTIFICATE OF CLASSIFICATION FOR SWIMMING POOLS

	Perfect Score
Pool Facilities	
1. Proper fence or barrier	4
2. Spectator provisions	2
3. Walk drainage	3
4. Overflow drainage	3
5. Type of overflow	3
6. Adequate walk area	12
7. Depth proportions	1
	20
Bathouse Facilities	
1. Shower facilities (warm water)	7
2. Toilet facilities (wet, dry, spectator's)	6
3. Floor drainage	2
4. Cleaning facilities	3
5. Lighting and ventilation	2
	20
Water Treatment	
1. Rate of turnover (8 hr. or less)	9
2. Rate and disposition of wash water	4
3. Water supply connection	6
4. Chemical application	3
5. Adequacy of disinfection and application	10
6. Hair strainer	2
7. Suction cleaner	1
	35
Operation	
1. Clarity of water	4
2. Inspection of bathers	5
3. Suit requirements (disinfection)	4
4. Condition of bathhouse	3
5. Condition of pool area	3
6. Adequacy and qualification of staff	4
7. Records and reports to state	2
	25
Total	100

First Parkway For Los Angeles

New grade-separated, divided-lane route will extend 6 miles up Arroyo Seco from monumental Figueroa St. viaduct in Los Angeles to Pasadena

CONSTRUCTION BEGAN late in March on the first contracts to be let for the new Arroyo Seco Parkway which will link downtown Los Angeles with the foothill cities of Pasadena and South Pasadena and other communities north and east of Los Angeles. Although the metropolitan area of Los Angeles contains many miles of wide boulevards, this new route will be the first with parkway characteristics such as grade-separated crossings and divided lanes. Costing about $3,500,000, the six miles of new construction will be spanned by 24 bridge structures of various types, with rigid frames and continuous concrete girders predominating. The south end of the route in Los Angeles is marked by the new Figueroa St. viaduct, a $600,000 high-level continuous-girder crossing of the Los Angeles River, with a main span of 200 ft., completed last year. This viaduct and the new parkway, taken together, constitute one of the notable traffic improvement projects of the year.

The parkway route

The route of the Arroyo Seco Parkway is indicated on the map, (p. 80) as is its connection on the south with Figueroa St. which extends as a wide boulevard into the heart of the Los Angeles business district and on the north with Broadway in Pasadena which taps the business district of this suburban city. Upon completion of the parkway the ten miles between the two business districts can be traveled in about 15 min., or 25 min. less than is required at present. On such occasions as the Pasadena New Year's festival and Rose Bowl football game, the saving of time by the new parkway will be even more conspicuous.

In some respects it might be said that the parkway was begun six or eight years ago with the construction of the tunnels through the Elysian Park hills, which give Figueroa St. a north outlet; and that construction last year of the viaduct over the Los Angeles River carried this work forward.

Fig. 1. Looking up the Arroyo Seco across the new Figueroa St. viaduct, first structure in the new parkway

The most recent project begins at the north end of this viaduct and follows the west bank of the Arroyo Seco channel for about 4 miles to the city line of South Pasadena. Throughout this section, the parkway traverses Los Angeles public park land, but after crossing the Arroyo channel into South Pasadena, the territory changes, and the parkway passes in a cut 18 ft. deep through a built-up residential area in a right-of-way located along an existing street. Eleven of the 24 bridges occur in this 1-mile section in South Pasadena. The final mile of the parkway consists of a circular route around a high hill which gives access to Broadway in the city of Pasadena.

Parkway design

No pedestrians will be permitted within the parkway section nor will the parking or stopping of automobiles be permitted. The parkway design provides two 35-ft. roadways for one-way traffic, and a center dividing strip, generally 6 ft. wide, raised and protected by curbs. These curbs are 6 in. high above the pavement surface and slope back 4 in. horizontally in the 6 in. height. Cast monolithic with the curbs, is a 12-in. gutter. The 11-ft. inside traffic lane, adjacent to the gutter, will be paved with asphaltic concrete 6 in. thick. Adjacent to this will be an 11-ft. lane of portland cement concrete 0.55 ft. thick with edges increased to 0.75 ft. Next comes a 10-ft. lane to be surfaced with a 3-in. bituminous plant mix surface which, as traffic develops, may be replaced with a heavier pavement. Finally, there is a 2-ft. concrete gutter and curb. Thus the parkway will provide three traffic lanes in each direction, marked not only by longitudinal joint lines, but also by the contrasting color of the portland cement pavement, curbs and gutters and the black asphaltic pavement. Along the outside edges of the roadways a minimum width of 3 ft. (generally more) is left for planting of shrubs and trees.

Since much of the highway goes through public park lands, a woven wire fence will be constructed on each side to make it impossible for children and others to stray onto the roadway. Planting on each side will conceal these necessary safety fences.

Inlets and outlets to the parkway are so designed that there is no left-turn or cross traffic. Outside lanes

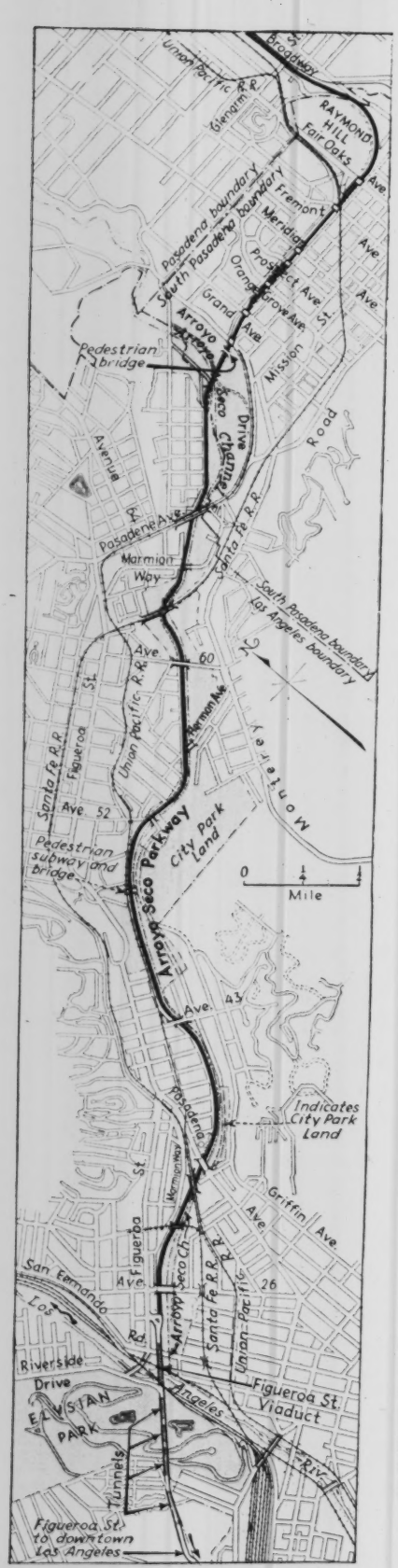


Fig. 2. Route of the Arroyo Seco Parkway, being built to connect Los Angeles and Pasadena

adjacent to these inlets and outlets will be widened for acceleration and deceleration of traffic, respectively.

Bridges

Of the 24 bridges to be constructed on this project, 15 are separations to carry highways over the parkway; 4 are separations to carry railroads over the parkway; 3 are to carry parkway or inlet roads over the Arroyo-Seco channel; and 2 are for pedestrian subways or combined bridle trail and footpath. Existing street bridges at Avenue 26 and Avenue 60 are to be remodeled and extended, and the same is true of the railroad bridge near Marmion Way. It had been planned to remodel the bridge at Avenue 43 also, but the March flood wrecked it beyond saving. The new bridge at this location, as well as the remodeling at Avenue 26 will be designed by the Los Angeles city bridge department. All other bridges will be designed by the state highway department, which will let all contracts and supervise construction.

In general, the new bridges will be of two-span concrete continuous girder or rigid frame type, with the center pier located in the parkway dividing strip. Each span will accommodate a 35-ft. roadway and a 3-ft. sidewalk. Exceptions to the two-span design occur for the bridge carrying the parkway over the Arroyo Seco channel and for the nearby bridge over Arroyo Drive. The channel crossing will be a three-span rigid frame of 75–118–75 ft. For the Arroyo Drive bridge, a single 80-ft. span concrete rigid frame will be used; it is at this point that the road leaves the park and enters the built-up territory of South Pasadena, and a single span was chosen as suggestive of a gateway. The design of this bridge is complicated by the necessity for carrying and concealing a large sewer immediately below its deck. It is the Arroyo Drive bridge and the structures at either side of it—a pedestrian bridge in the park and the grand Ave. crossing—which constitute the first contract, upon which work was begun in March.

Figueroa St. Viaduct

The viaduct which carries Figueroa St. over the Los Angeles River, although completed previously, is a vital part of the Arroyo Seco Parkway project. Its principal structural feature of note is its use of double-web, T-flange girders of exceptional depth. Of its total length of 900 ft., the north approach, consisting of five 74-ft. continuous concrete girders over San Fernando Road, a heavily traveled main arterial between Los Angeles and Glendale, was designed by the city of Los Angeles bridge department, while the three main steel spans of 127, 200 and 103 ft., over the river and the Southern Pacific R.R. tracks, was designed by engineers of the state highway department.

The main river bridge superstructure consists of three lines of girders on 22 ft. centers, supporting 27-in. floorbeams and a 10-in. concrete slab with a 3-in. surfacing of asphaltic concrete. The girders are continuous over the 200-ft. central span and cantilever 51 and 61 ft. into the side spans to hangers which carry one end of simple span girders whose opposite ends rest on the abutments. The hangers consist of two 14x1½-in. silicon steel plates 2 ft. long, connected at the top to a 6-in. diameter pin in the cantilever girder and at the bottom to a similar pin in the suspended girder. Two angles, 4x4x½ in., riveted to one girder just above the bottom flange and sliding against the other provide for transfer of lateral forces across the 3-in. open joint at these hanger points.

Unusual girder makeup

The main girders are 13 ft. 4 in. deep at the piers and 9 ft. deep at the center of the span. The girder makeup is varied from usual practice in that a 33-in. WF 210-lb. section is split into two T-sections to form the main flange elements. Two ⅜-in. web plates are riveted to the stems of the T-sections and separated from each other by 3x⅜-in. horizontal filler bars spaced about 3½ ft. apart vertically, an arrangement which causes both webs to act together as a unit with a stiffness equivalent to that of a 1½-in. web. Two 8x4x½-in. angles, placed as shown in Fig. 5, complete the section used as a minimum flange throughout the entire three spans. Additional material, in the form of angles and side flange plates, is added to form the maximum section.

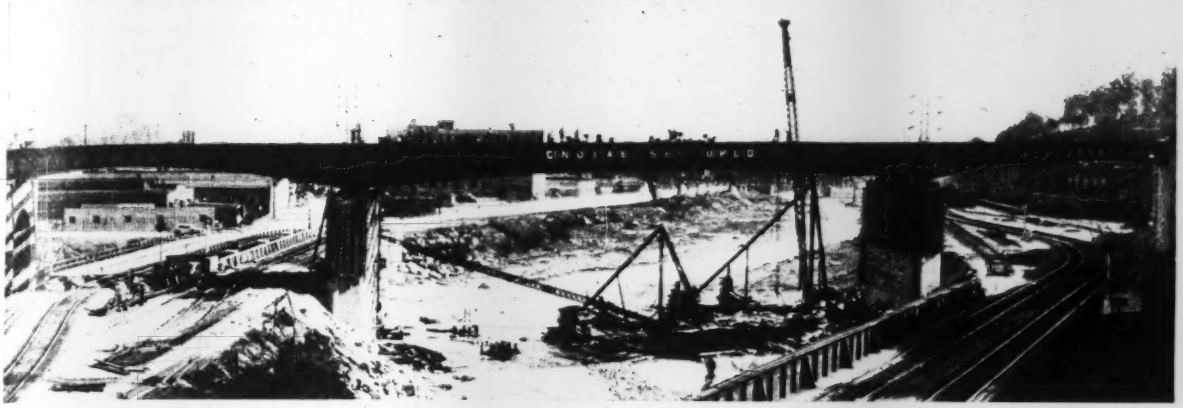


Fig. 4. Deep, long-span steel girders characterize the new Figueroa St. viaduct that carries the Arroyo Seco Parkway over the Los Angeles River and the lines of the Southern Pacific Company. The bridge in the foreground and much of the track at the left was washed out by the March flood

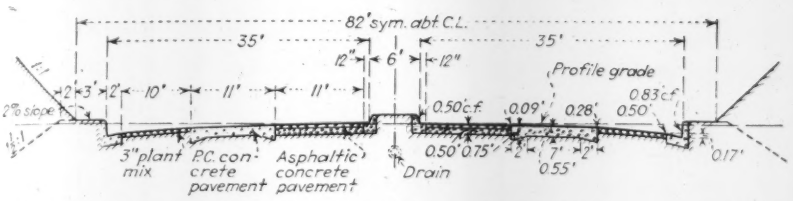


Fig. 3. Typical pavement cross section of Arroyo Seco Parkway, contrasting colors of surfacing definitely mark traffic lanes

Stiffener angles are used on both sides of all girders. For the sake of appearance those on the outside of the two curb girders are placed truly vertical and evenly spaced on 5 ft. centers. Elsewhere the stiffeners, including those supporting floorbeams, are placed normal to the top girder flange, which is on a $2\frac{1}{4}$ per cent grade. Stiffeners, except at the piers, extend only between the flange angles, and so are 3 ft. shorter than the girder depth (See Fig. 5). At the piers the outstanding legs of the stiffeners are extended to the bottom of the girder, and their ends are milled to bear on the T-flange. Where these outstanding legs cross the bottom flange side plates they are stiffened by small angles. The stiffener arrangement at the piers is indicated by the dashed lines on Fig. 5.

The arrangement of T-sections and double web plates was first used and patented by Weiskopf & Pickworth, consulting engineers of New York City, and has been incorporated in a number of buildings as well as in some railroad girders in the Pittsburgh post office, but the Figueroa St. viaduct is the first highway structure for which they have been adopted. The use of T-flange girders in the design of this viaduct is said to have been prompted more by the possibility for architectural treatment and for easy fabrication than by their value in eliminating stiffener angles on shallow depth girders or in providing greater load capacity between flange and web. In previous installations these latter advantages have been important but they were of secondary weight on the Figueroa St. viaduct since the girder shears in highway spans are relatively low.

The use of side plates instead of cover plates to build up the flange section not only preserved a smooth, curved bottom chord, but it promised the only satisfactory method of fabricating the girders. In the first place, rivet grips up to $8\frac{3}{4}$ in. were required, and the girder makeup made it possible to arrange details so that all rivets of long grip could be shop driven. Also the elimination of cover plate riveting along the curved lower flange resulted in considerable saving in that drilling or subpunching and reaming, either of which would have required a different angle of attack at every rivet hole along the curved flanges, was avoided. A difficult fabrication problem was presented at the piers where the sloping bottom flanges were re-

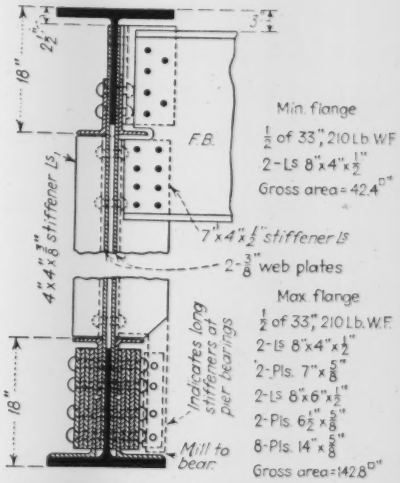


Fig. 5. Make-up of T-flange, double-web girders in Figueroa St. viaduct

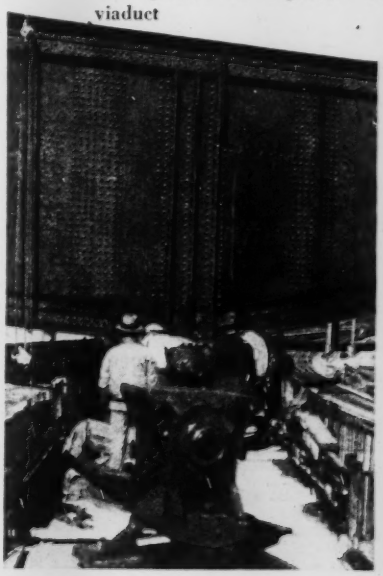


Fig. 6. Setting alloy cast steel expansion bearing under one of the T-flange girders

quired to be bent to the horizontal (to take the bearing shoe) without interrupting their continuity. This was accomplished by notching the stem of the T flange and the side reinforcing at the bend points, bending the edges of the V-notch together and then welding and grinding smooth.

Two field splices used

Two field splices were located in the 200 ft. span, 47½ ft. from one pier and 37½ ft. from the other, these points being about half-way between points of contraflexure. This left a center section of girder 115 ft. long to be erected as a unit. By special rolling, the flange beams were provided in one piece 115 ft. long, thus eliminating additional splices in these members.

Structural silicon steel is used for the continuous girders and intermediate grade carbon steel for the suspended girder spans at the ends. The maximum girder reaction is 1,431,000 lb. The maximum negative moment developed in a girder is 30,280,000 ft.-lb. at the south main pier, but the maximum positive moment of 18,860,000 ft.-lb., occurring at the center of the main span where the depth is only 9 ft., required the heaviest flange section in the bridge.

Administration

The Arroyo Seco Parkway project is a joint enterprise of the California state highway department, the cities of Los Angeles, Pasadena and South Pasadena and the U. S. Bureau of Public Roads. For the state highway department, which is charged with the major part of the design and all construction supervision, the work is under the direction of S. V. Cortelyou, district engineer, Los Angeles. F. W. Panhorst is bridge engineer, California highway department. On the Figueroa St. viaduct, the Clinton Construction Co. was the general contractor, and the Consolidated Steel Corp. the subcontractor for fabricating and erecting the steel. For the City of Los Angeles, Lloyd Aldrich is city engineer and Merrill Butler, engineer of design. Harvey W. Hincks is City Engineer of Pasadena and Frank Clough of South Pasadena. C. H. Purcell is state highway engineer for California.

Soil Load On Buried Plates

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U. S. Engineer's Office, St. Paul, Minn.

Indicative determinations of soil settlement load made on ties between sheetpile walls holding earthfill

THE ABUTMENTS of Mississippi River Dam No. 3 consist of two parallel rows of 55-ft. steel Z-piling 106 ft. apart connected by horizontal tie rods. The design involved the determination of pressures which a sand fill would exert as it settled past the tie rods. The height of fill between walls above original ground was about 40 ft., and the settlement expected was between 0.5 ft. and 1.5 ft. It was decided to perform a series of tests to determine the loads produced by the settlement.

Testing apparatus and tests

Two lengths of tie plate were tested, 6 ft. and 3 ft. long. The cross-section of the plate was ¾x8 in., a section which had been determined analytically and selected instead of a circular section because of its increased resistance to bending and its greater ability to knife through the soil than a circular section of the same area. This was the exact size of the plate to be used in the actual structure. Because of the difficulty in simulating the effect of earth settling past a tie plate, the tie plate was pulled up through the earth.

The apparatus consisted of the plate on the ends of which were fastened two vertical straps or hangers. These hangers extended above ground and were pinned to opposite ends of a beam supported by two hydraulic jacks. The jacks were supported independently by two 24-in. wide-flange beams with a 26-ft. span resting on timber piling. A ¾-in. pusher rod was fastened to the buried tie plate next to the hanger bar, and extended above the surface of the ground. On the top of the rod a collar acted on the plunger of an Ames dial, and any movement of the bar was thereby indicated on the dial. The dial was supported by a bracket from a third 24 in. wide flange beam which spanned across the test area to fixed supports.

Although the tie plates as designed for the abutments would be buried 12 ft. and 27 ft., the practical limit of depth for the test to be made was believed to be 12 ft. and tests were planned at this depth with auxiliary tests at 6 ft. depth to indicate the effect of depth on results. Since considerable variation in soil load would be expected with variation in density or compactness of the fill, a test was made on the loosest possible fill and also on one in which the fill was spread in 4- to 6-in. layers and carefully tamped twice by hand. Thus by obtaining more or less extreme values, the ordinary values would be bracketed in between. The material used in the tests consisted of a medium river sand with small percentages of silt.

In Test No. 1 and in many of the following tests, particularly in the higher loads, it became apparent that a long period of time must elapse before the plate came to equilibrium. In some cases each increment of load would have extended the test several days. Neither time nor the expense involved permitted each increment of load to be carried to complete equilibrium, and therefore the loads were increased as the practical requirements of the test demanded. Readings also were speeded up to one every 5 min. As it was, the progress of construction of the lock forced cessation of the testing.

Unfortunately for Test 2, the bottom 2 ft. of the excavated hole filled with water, which drained in from a broken water main in the vicinity. The material which was dumped in and tamped in the usual manner consequently became saturated and more plastic than it would have been in the natural condition. It is believed that undoubtedly this condition tended to lower the maximum loads.

The time-deflection curves showed a rapid deflection under the initial application of each increment of load and then a gradual slackening in deflection until equilibrium was reached. Where a condition of equilibrium was clearly obtained the load and deflection could easily be tabulated. However, as mentioned above, the length of time required to reach equilibrium under each application of load was frequently a matter of several days. Therefore, to speed up the testing the time-deflection readings were carried on only for a period of time believed sufficient to establish the trend of the curve which could then be projected to the condition of equilibrium.

From the maximum loads and deflections tabulated for the conditions of equilibrium a set of load-deflection curves was next prepared. Fig. 2 shows the load-deflection curve for Test No. 1 which is typical of the others. These curves showed a small deflection under the first few increments of load and then gradually increasing deflections with each increment of load until the load became so high that deflection continued to occur with no indication of ever reaching equilibrium.

Naturally the last actual point on the load deflection curve was a position of equilibrium, but from the shape of the curve it was obvious that by a slight projection to a load of greater magnitude failure would result. Thus, for each test the maximum load sustained by the bar could be quite accurately obtained.

From the curves just described information was obtained for the plotting of the final curve or chart to show the relation of load to density and depth. This information is given in Fig. 3. A definite increase in maximum load is apparent with an increase in either density or depth. The density shown is an average of careful laboratory tests on two samples, one just over each end of the bar. The total net load is the sum of the loads on the jacks minus the dead load of the equipment resting on the jacks. As noted in Fig. 3, Test 2 was undoubtedly affected by the water present in the bottom of the test pit. The correction indicated, while based on judgment and the results of the other tests, is nevertheless somewhat arbitrary. However, it is believed that the adjusted point is not far in error.

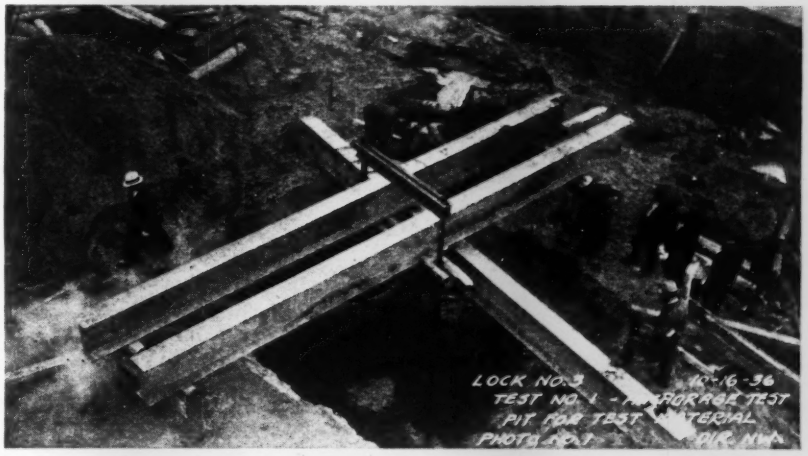


Fig. 1. Test set-up before the jacks had been set on beams spanning the test pit.

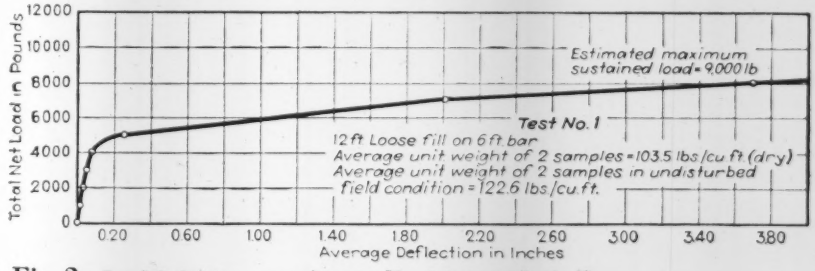


Fig. 2. Load-deflection curve for test No. 1 is typical of all.

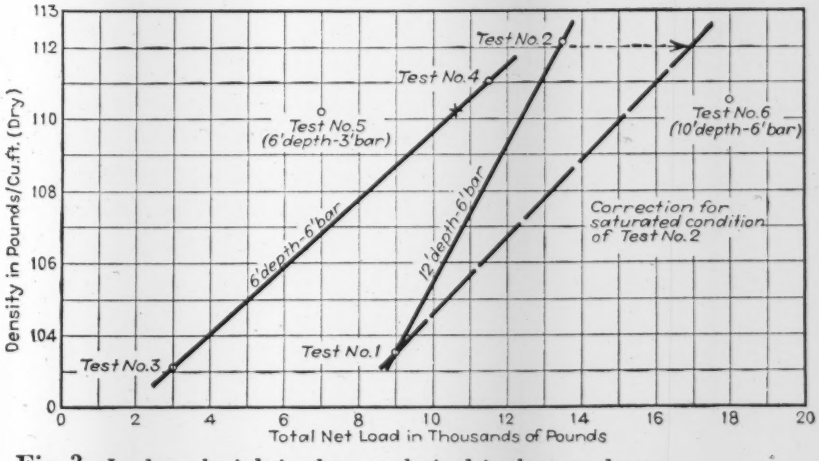


Fig. 3. Loads on buried tie plates as obtained in the several tests.

No attempt is made in Fig. 3 to reduce loads to a lineal foot of plate or to suggest how these results may be applied to tie plates or tie rods of different shape. Further tests covering a greater range in depths, lengths, and of varying cross-sections will be necessary before this is possible. However, it is believed that the results of the tests given herein tend to fill in a small way a lamentable void in engineering data on questions of this kind.

Acknowledgment is due to H. M. Hill, senior engineer, U. S. Engineer Office, St. Paul, who, with the writer, conceived and planned these tests, and also to Major Dwight F. Johns, then district engineer, who authorized the work and cooperated in making the tests possible. Paul W. Lorens, junior engineer, U. S. Engineer Office, St. Paul, supervised the field work and also assisted in the analysis of the data. Spencer, White & Prentis, Inc., contractors for Lock 3, contributed to the success of the tests by the loan of part of the equipment and by cooperating in the work.

Parking Meters Win Favor In Pennsylvania Cities

Meters facilitate enforcement of parking regulations and help traffic flow in downtown areas

SCRANTON AND WILKES BARRE, cities in the anthracite coal regions of eastern Pennsylvania where traffic is heavy, have found that parking meters are a big help in alleviating street congestion. At Scranton, where the meters were installed only last April, a novel system has been introduced which permits a free five-minute parking period at alternate spaces along the curb. This feature won the approval of those who had previously objected to metered parking. Merchants in the central shopping district in both cities have noted increased business since the meters were installed. City officials likewise are enthusiastic over the results because the meters have eliminated "all-day parkers" and have facilitated the enforcement of parking regulations.

Scranton has 900 meters in operation. Half of these are of the general type wherein a coin must be deposited as soon as the space is occupied, while the remainder are of a type that permits five minutes of free parking after which a coin must be inserted if the space is to be occupied for a full hour. The two types of meters are alternately installed along the curb so that there is a "free period" parking space for every full-time payment space. The meters are spaced at 21-ft. intervals so that there is no crowding or difficulty in maneuvering a car into position.

Meter operation is supervised by the policemen who are assigned to general traffic duty in each block of the central city. Violators of regulations are subject to a dollar fine, and once a summons is issued it cannot be "fixed." The summons is made out in triplicate, one copy each for the offender, the police chief, and the city comptroller. The comptroller files each summons as a receipt for one dollar payable to the city.

"Free time" meters (above) at alternate spaces. With 21 ft. between meters (right) there is enough space to manoeuver a car.

Collections from the meters are made daily by two men. For the month of May, the total receipts were $5,044. The companies who installed the meters receive 75 per cent of the receipts until the meters are paid for, and the city retains 25 per cent. The city made no original investment in the meters which were priced at $60 and $55, respectively, this price covering both installation and maintenance.

Starting off with a trial installation of 200 meters in April, 1937, Wilkes Barre has indicated its approval of parking meters by adding 300 more last August and 200 more this June. Merchants have expressed themselves as unanimously in favor of the scheme. Surveys have revealed that traffic in the central shopping district is reduced because many people are now finding it more expedient to leave their cars in the parking lots on the fringes of the district rather than enter the metered area.

The metered area is divided into three zones with varying time limits; in the central area the meters are adjusted for 45 minute periods, while the intermediate and outside zones permit one- and two-hour parking periods, respectively. Two policemen supervise the central district meters and the other zones are supervised by two motorcycle patrols. Collections are made daily, for which two men are required for half a day.

Receipts from the 500 meters installed last year averaged from $3,000 to $4,000 per month. The cost of these meters plus installation charges was $57 each. The 200 meters purchased in June cost $31 each, but the city installed them.

The information on which this article was based was furnished by Charles N. Loveland, mayor of Wilkes Barre, and by Charles F. Schroeder, city engineer of Scranton.

National Conference on Planning

GEORGE H. HERROLD
Planning Engineer, St. Paul, Minn.

Planning officials meet to discuss the development in national, state and regional planning

THE National Conference on Planning held in Minneapolis and St. Paul, June 20–22, brought together the largest group of national, state and city planners gathered in a number of years. The Planning Commission at Minneapolis was the sponsor; associated sponsors were the City Planning Board of St. Paul, the Planning Department of Duluth, the Minnesota State Planning Board and various civic and technical groups.

The conference was conducted by round-table and panel discussions, four groups meeting simultaneously and devoting an entire half day to the discussion of each subject. Each group had a reporter to summarize the committee reports and discussions, which summary was presented at a session held during the morning of the third day.

In covering certain subjects relating to planning, there was of necessity an overlap of topics and as a result some of the most valuable discussion developed in inappropriate sessions. This was ironed out somewhat by the reporters in preparing their summary for the final session.

No small measure of success of the conference lay in the excellent selection of committee personnel, reporters and discussion leaders.

Traffic engineering

The committee on traffic studies in relation to city planning tried to develop the idea that while traffic studies bear a definite relation to city planning, traffic engineering is not simply a detail of city planning but something that must be directed by trained engineers while city planning may be done by trained men of other fields.

There seems to be a growing feeling that the mass of data being collected in regard to traffic matters is not of great value because it cannot be analyzed except at great cost, and where it can be analyzed the results simply prove something that is already known. Consequently it was suggested that progress in traffic engineering can best be advanced by conferences of traffic men who are up against a daily traffic problem. From their wealth of accumulated knowledge, these men can come to decisions as to what is necessary to advance city traffic-planning programs.

The relation of traffic to out-dated housing was considered worthy of more extended study. Every city is faced with the problem of maintaining values in its downtown district. Further decentralization and loss of millions of dollars in property values will occur unless some solution is found for the parking problem. Zoning, street widening and parking meters were considered as helpful in checking this decentralization.

The subject of planning a housing program brought out one of the largest sectional groups. The committee reporting on this subject has given considerable attention to the technique of making surveys for determining the need for housing. The sophistical attitude of housing agencies toward planning was disapproved.

In discussions of the relation of housing to public health it was brought out that poor housing does not necessarily increase the death rate, but sub-standard living conditions do have a detrimental effect on the entire upgrowing generation that is forced to live under such conditions. Further study seems advisable on the effect, from a city planning standpoint, of housing projects on the surrounding areas to determine whether it is necessary to build barrack-type houses with a concentration of twenty-five families to the acre in cities where the average population density is from one to four families per acre.

It was pointed out that health departments are in a strategic position to force rehabilitation of slum districts if they will take full advantage of laws that are now on the statute books. However, the view was expressed that though the present laws potentially make this possible, the laws cannot be made effective without public support.

In discussion of "Capital Budget and Improvement Programs" it was stated that the depression had caused a breaking down of theories concerning special assessments for city-planning improvements. Nevertheless, if a program is really comprehensive and serves all parts of a city in such a way that all get a fair share of the benefits, issuance of bonds for planning improvements may be found as fair as any method. The increase in property values from such improvements will be reflected in an increase in taxes.

The desirability of municipalities owning more land was brought up by the urban land committee, and information as to how such municipally owned land is used in foreign countries was presented. Some foreign cities of over 50,000 population were found to own 24 per cent of the land within their control exclusive of streets and land used for sewage disposal plants and similar services. Of this municipally owned land, less than 5 per cent is occupied by buildings. The remainder is occupied by forests, parks, etc. Such land reserves were common in the early history of American cities, but they were lost during the era of land speculation.

National planning

While the conference members seemed to be in accord as to the value of a national planning board, the members expressed no clear opinion as to the program to be followed by such a board. The conservation of water resources and of land was recognized as having a nation-wide import which would make it desirable for a national board to cooperate with and coordinate the activities of the state boards. A national agency may also be very helpful in settling regional problems, but as to the final rela-

tionship of the national planning board to all other planning agencies no decision was reached.

In considering state planning the thought was expressed that the state planning board may be very helpful in assisting the organization of local boards and in calling them together for the discussion of common problems. However, it was noted that the function of the state board should be educational and inspirational and should not be carried to the point of actually financing local planning operations.

The value of county zoning in protecting roadsides and the importance of planning roadside developments as roads are constructed and not afterwards were emphasized in the discussion of regional planning.

There was a strong recommendation on the part of the urban land committee, which was concurred in by the discussers, that tax-delinquent land in over-subdivided territory be held by the state or city and not sold; that it is better that these properties stay off the tax roll until more intensive development requires them. It is especially desirable that tax-delinquent lands along streams be held until a real demand develops, for they are more likely to become dumping grounds than home sites.

The committee made the significant tax-revision proposal that by progressively lowering the rate of taxation on buildings and increasing the rate on land the public welfare would be advanced by penalizing those who hold desirable land out of use for speculative purposes. These urban planners were not advocating the single tax but they were seeking a correction of conditions which arose through the great American game of gambling in land values. There was clear evidence that city planners are beginning to see the need for control of tenure.

There also was evidence that those engaged in rural zoning are working out a technique quite superior to the technique of city zoning, at least as that technique is exemplified in the older ordinances. The old guard which has followed the conferences on city and regional planning for many years now admits that rural planning is catching up with city planning.

Holding this conference in the northwest for the first time gave many engineers and officials their first opportunity to meet city planners and to hear about planning from official experts. It was a good stroke of business on the part of the conference director and his committee, and many converts to the city planning idea were made.

Store Skewed In Moving

Nine-story building weighing 8,000 tons skewed laterally to fit new location in a 112-ft. move

SWINGING one end 9 in. and the opposite end 3 ft. laterally was an interesting detail of moving a heavy building at Hartford, Conn., 112 ft. to a new location. The building is 83x140 ft., nine stories high, steel-frame and brick curtain-wall construction and as moved weighed about 8,000 tons. The actual moving took two days and during this time

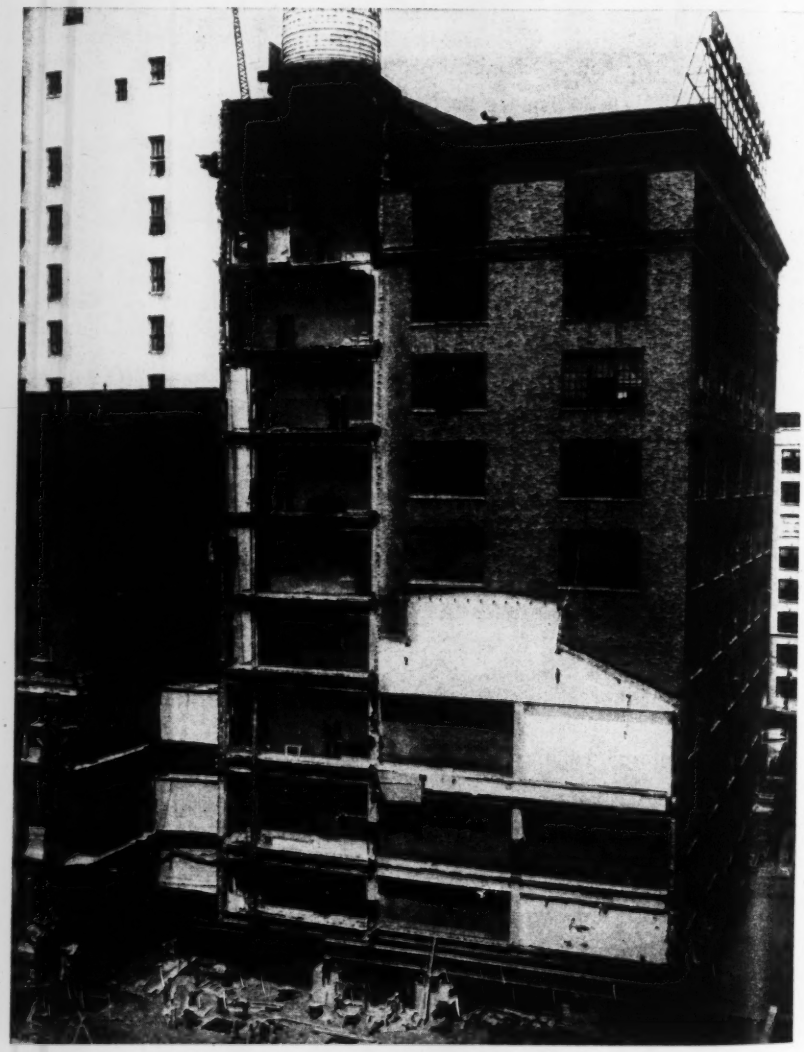


Fig. 1. Business as usual. No interruption of services or inconvenience to occupants occurred during the moving of this nine-story building in Hartford.

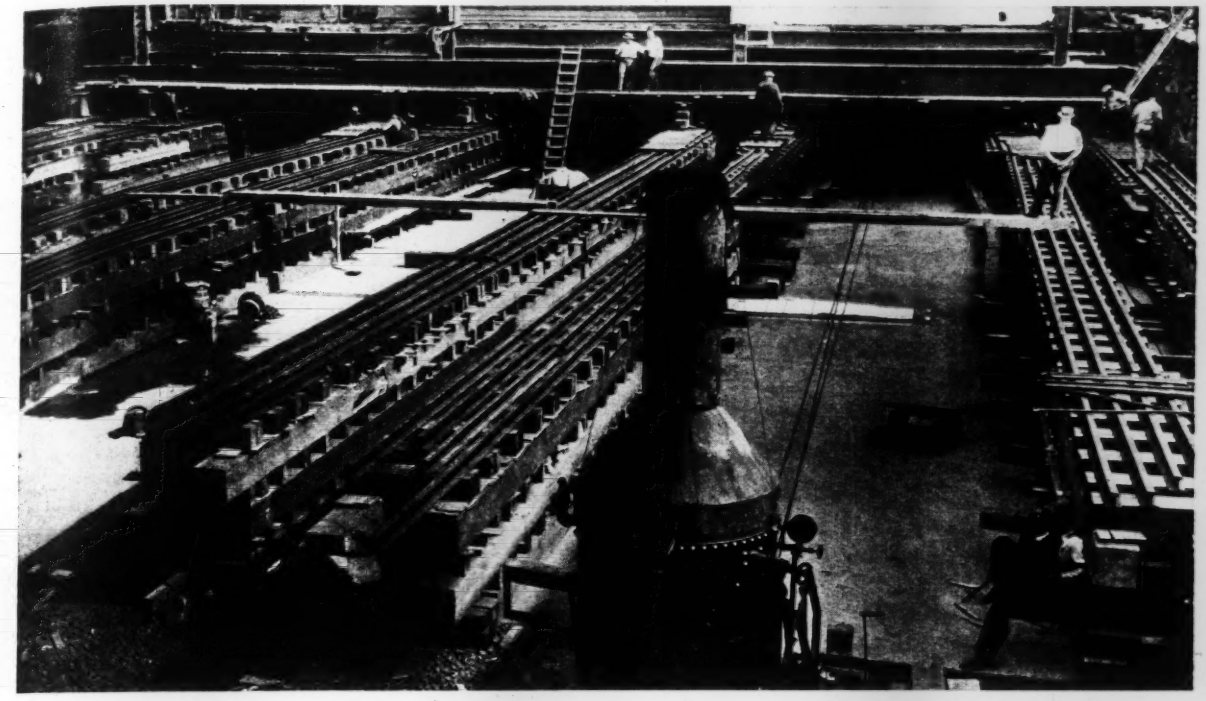


Fig. 2. A steel underframe carrying the 8,000-ton building moved on rollers over multiple-rail tracks on heavy timber cribbing.

and the period of preparation for moving all business was carried on as usual. Three elevators were in constant operation and all water, sewer, gas and electric service was maintained.

Details of the moving

The procedure was as follows: The excavation for the sub-basement at the new location was completed and new concrete piers were constructed and a reinforced concrete floor laid over the new basement site. All machinery, apparatus, appliances, etc., were removed from the old sub-basement, the 28 steel supporting columns were stripped of all plaster covering and the outside concrete walls were removed.

A rigid steel carrying frame weighing 300 tons was riveted to the 28 supporting columns; under this a sufficient number of high-powered jacks were placed, and the entire building was raised ¾ in. Timber cribbing of 12x12 and 6x8-in. Oregon fir was built on the concrete floor upon which was placed tracks of 80-lb. steel rails as shown by the accompanying illustration. Then 1600 3-in. cold-rolled steel rollers were inserted between the top of the rails and the underside of the longitudinal beams of the carrying frame, and the load was transferred to the rails by driving steel shims and releasing the jacks. The timber cribbing and rails were extended over the entire route of the move.

The motive power consisted of two 3-drum steam hoists to which were attached three sets of ⅝-in. plow steel cable. Each set consisted of 18 parts so that a total of 54 parts were employed in the moving.

Rollers set at angle

A feature of the work was that while moving the building longitudinally 112 ft. it was simultaneously moved laterally 9 in. at the southeast corner and 3 ft. at the northeast corner. This was accomplished by setting the steel rollers at the proper predetermined angle so that when the move was completed the building was exactly on the line at both corners.

The maximum settlement of the building after reaching its new location was ⅜ in., which caused no perceptible damage to the structure. The work required 300 tons of structural steel; 200 tons of steel rails; 1600 3-in. steel rollers; 8,000 ft. of plow steel cable; 300,000 ft. b.m. of timber, or a total of 32 carloads.

The work was done for G. Fox & Co., Hartford, Conn., by the Southern New England Contracting Co., Inc., general contractors, Hartford, Conn., and the Eichleay Engineering Corp., moving contractors, Philadelphia and Pittsburgh, Pa.

• • •

Fee to Highway Engineer Is Held Improper

ACCEPTANCE of consulting fees from Missouri counties by employees of the Missouri state highway department has been held to be an improper action, although not illegal, by Chief Engineer W. Brown. The decision was made in the case of a division engineer after it had been revealed that he had accepted a consulting fee of $500 from New Madrid County for work done as a consulting engineer on some county highways.

"The Commission has been informed," Brown said, "that the acceptance of such a fee is not illegal, but such practice is improper on the part of any employee of the state highway department, especially because the road law . . . instructs the commission and department to aid county officials and civil subdivisions."

How to Paint Road Signs Cheaply

P. T. MARTIN

Iowa State Highway Department, Council Bluffs, Ia.

Methods and equipment for cleaning and painting road signs that have reduced costs from 24 to 9 cents per square foot in Iowa

PROBABLY no sight is more familiar to the motorist than the road sign. Probably also next to the road surface itself the motorist's opinion of the travel service offered is most influenced by the clearness and neatness of the road signs that guide and warn him as he speeds on his journey. Yet road signs discolor and get out of shape with use and have to be reconditioned systematically or they cease to be clear and neat. This is a maintenance job and a bigger and more expensive job than perhaps most persons surmise, and methods and costs of performing it are an important consideration in highway operation.

As engineer in charge of the sign department for District 4, Iowa department of highways, the writer has developed methods and equipment, now standard for the entire state, that have proved rapid and have reduced costs. In response to many requests the following advice is offered from the experience that has been gained.

A good shop comes first

The first need in reconditioning signs, is a suitable shop and equipment. Unless the selection of these is wise, the sign department will be under a handicap and likely to prove an inefficient, expensive and a discouraging enterprise.

The building should be large enough to permit the work to be carried on without crowding. The services of various departments of highway work are constantly expanding. This is true of the sign department, and if the shop is merely large enough to serve for the present, in two or three years it will be too small and cramp production. The building should have three rooms for work and stock, and one for the power plant. These rooms should be large enough to do the work without crowding. Our rooms are 24x28 ft.; one room for cleaning, one for painting and one for the stock of painted signs. The floors should be of concrete and in the stock room, by reason of the great weight carried, the floor should have steel reinforcing and a much heavier slab.

Equipment is vital

The production ability of a sign paint shop is controlled by its equipment. May I quote from our experience in this matter to illustrate this fact. In cleaning the old paint off the signs, we first used a chemical method and while this method could clean the signs most thoroughly, it was cumbersome and difficult. Our total cost of repainting the signs under this method of cleaning ran about 22c. to 24c. per sq.ft. Later we put in a sandblast cabinet, without a generator; this method of cleaning the signs with a sandblast made it possible for us to repaint the signs at a cost of from 15c. to 17c. per sq.ft. Later, owing to the heavy cost for electric current, we put in a Diesel motor, and added a generator to the sandblast, with the result that our costs are now about 9c. per sq.ft. (These prices do not include depreciation and overhead charges). From the above, it is evident that the equipment is largely the controlling factor of efficiency and production as well as cost. Our electric motor cost us about $80 per month for current; our Diesel motor costs us about $12 per month. As to speed we found that with the generator attached, we doubled our footage in cleaned signs.

The compressor should be large enough to deliver the required amount of air (this will be regulated by the size of the cutting nozzle); and this amount of air should be delivered without taxing the capacity of the compressor. In setting up this equipment, the connecting air pipes should have drain cocks at every change in levels of pipe, the air tank should be equipped with an efficient air dryer and every precaution made to insure the dryness of the air when delivered to the sandblast.

The paint room will need, first of all, a paint booth which should be so designed as to eliminate all sharp angles or corners which form air pockets, inclining all the walls of the booth in a streamline manner to the air-vent. The booth should be equipped with an air blower of the suction type for pulling out the fumes and spray residue. The size of the paint booth must be worked out to accommodate the largest signs to be painted. The paint gun should be chosen on the basis of its capacity, or the speed with which it can deliver a broad-pattern spray. We have found the DeVilbiss or Binks guns very efficient and satisfactory; they are sturdy and capable of very fast work. A pressure pot is needed as it has a regulation of paint delivery to the gun which is very efficient.

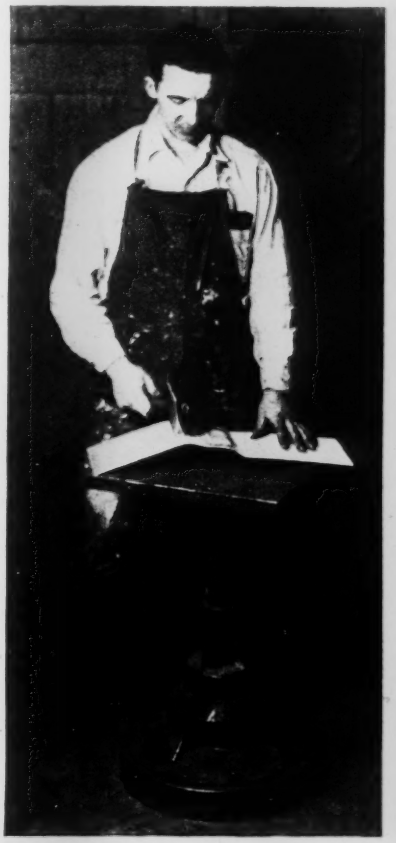
The drying racks, while important, are a comparatively simple matter. We use racks which will accommodate 100 state or federal markers on each side. At least three or four of these racks are needed. We construct them of 2x2-in. material set on a base with casters.

A lettering or rolling machine is very important as hand methods of rolling the letters on a sign are inefficient and cumbersome. I do not know of such a machine on the market; ours was designed and perfected at our laboratory in Ames, Iowa.

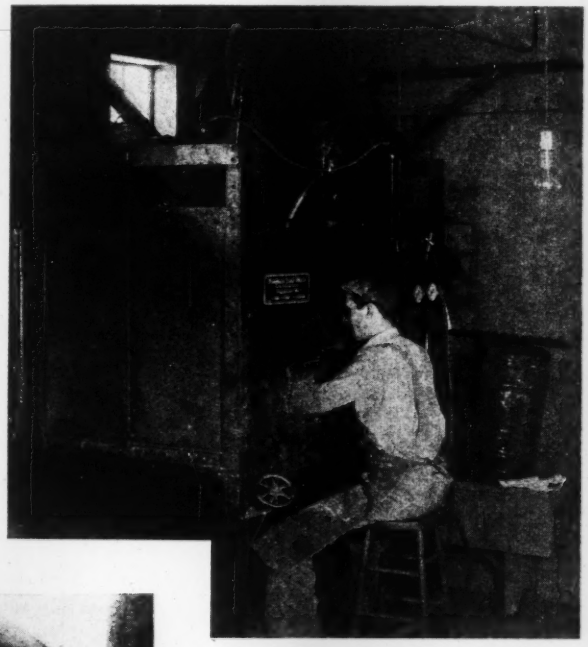
Preparing the sign

It would be very unfair if I did not stress the point of production. The ability to make a large and uni-

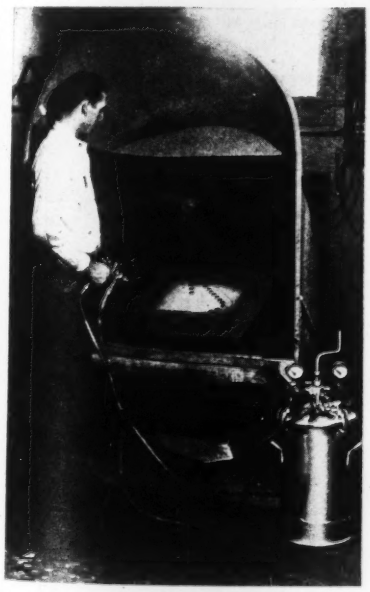
The road-sign paint shop needs ample room and space to grow.



To straighten bent sign plates provide a heavy anvil and have several sizes of hammers.



A sand blast with 80 lb. nozzle pressure and using angular steel grit is recommended in preference to any chemical method.



Have the painting booth hood streamlined to the exhaust stack and provided with an ample exhaust fan.

For lettering have the department shops build a power rolling machine; hand rolling is slow and inefficient.

form production is the key to economic success in this important and specialized service. The equipment I have indicated will make such a service possible, but men trained to this service, working under the direction of competent men, will be needed. These men, or supervisors, should have more than a theoretical knowledge of the work, otherwise they cannot direct the activities of such a department efficiently.

To prepare the sign for painting, the first process is to clean off all of the old paint and rust, leaving the metal perfectly clean and bright. If using a sandblast for this purpose, we find that angular steel grit is the most suitable material, size 50 to 60 is recommended. The air pressure should be 80 lb. at the cutting nozzle. Our records show that with a sandblast cabinet equipped with a generator, and using angular steel grit of this size with 80 lb. pressure, we can clean 100 sq.ft. of surface per hr.

After cleaning, the sign must be thoroughly straightened. To do this work a straightening stand is needed. This can be constructed quite easily; the top should be of either malleable iron or steel, at least 20x20x1¼ in. If a lighter-weight top is used, it will have too much give under the hammer to work as easily and efficiently as it should. The flattening tools should consist of one 2x2 in., one 1x3 in., and several smaller hammers to reach into the indentures of small letters and straighten out damaged places. The edges of the sign should be very carefully straightened. The flattening tools can be made to suit the need in any first class machine shop. The hardness of the tools must be determined by trial; when properly tempered they will last under hard usage indefinitely. Our present set is in good condition after two years.

Painting the sign

The painting, while exacting, is a comparatively simple operation; the choice of paint is the problem that is difficult. I can only indicate that there are two general types of paint largely used for this type of work; they are lacquers and synthetic enamels. We have used both types of paint and from service on the road, we prefer at this time the synthetic enamel. It has a better wearing quality but is not as easily manipulated and requires more careful handling.

In painting the sign with lacquer, we find that three coats are necessary for the best results; first, a smoke coat of priming, and one undercoat (we use aluminum for this coat of paint), then one thorough coat of the lacquer. With the synthetic enamel, we use two coats; a prime coat of light colored primer, preferably of synthetic gums (this coat should cover thoroughly) then one coat of the synthetic enamel. This should make a well-finished job. Lacquer paint has the seeming advantage by reason of its easy handling qualities; the synthetic enamel is more durable, no more expensive, and experience proves it more satisfactory.

When painting the signs, they should first be stacked in sizes according to their type, the edges should then be painted, being careful to cover well, then the signs placed in a booth for painting. Paint the back first and place the sign in the drying rack and leave until thoroughly dry. After the signs are dry on the back, paint the faces. Do this with each coat of paint. After the finish coat is on, the signs are ready for the rolling machine. If such a machine is not available, a substitute may be made by using a printer's roller; secure one about 4 to 6 in. in diameter and of a length to reach and cover the largest signs. The hand roller is slow and hard to operate but the work can be done with one of them. After rolling, the signs will have to be touched up.

The above mentioned 9c. per foot is the figure we have reached in our little territory of eighteen counties. This price can be materially reduced by increasing the volume of work; the equipment indicated will carry a production of 200 per cent more than these counties require, with a material saving in foot-costs.

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Carrying Scrapers Mix Borrowpit Material

UNITY DAM on the Burnt River in eastern Oregon, recently completed by J. A. Terteling & Sons for the U. S. Bureau of Reclamation, is one of the smaller earth-fill dams of the West, but borrowpit conditions required special handling of the fill. The available pits for supplying fill for the 207,000-yd. embankment consisted of various strata of clays, sand and gravel. To assure proper mixing of these materials in the rolled-fill section of the dam, the specifications required: "Each load of earth-fill material delivered on the embankment shall be the equivalent of a mixture of materials obtained from an approximately uniform strip or cutting from the full height of the face of the excavation."

To meet these requirements the contractor utilized carrying scrapers for the excavation and haul, pulled by diesel tractors. The scrapers loaded on the down grade, each load cutting through all the layers of various materials in the pits. As the haul averaged 2,500 ft., hauling efficiency was increased by the use of two scrapers in tandem to each tractor. Two of the units included one 8-yd. and one 12-yd. scraper; the third unit, shown in the illustration, was two 12-yd. scrapers.

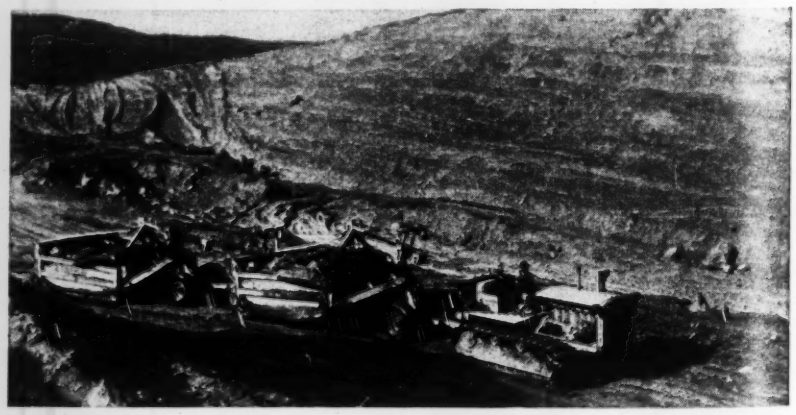


Photo from R. G. LeTourneau, Inc.

Carrying scrapers in tandem mix borrowpit materials at Unity Dam.

Sewer Trenches Sheeted With Plywood Panels

C. H. ASHDOWN

District Engineer, Bloom Township Sanitary District, Chicago Heights, Ill.

Savings effected by reduction in trench width, ease in handling sheeting and elimination of wales

REPLACEMENT of the customary trench support of timber sheeting, wales and braces with simple plywood panels held by trench jacks has met with considerable success on four large sewer projects for the Bloom Township Sanitary District at Chicago Heights, Ill. This new method of shoring utilizes standard 4x8-ft. concrete form panels of ¾-in. plywood. The panels are placed horizontally, with plywood cover plates over the end joints between panels. Screw trench jacks bear against the timber blocks to hold the sheeting in place. In most ground the jacks are spaced 8 ft. apart, located at the panel joints.

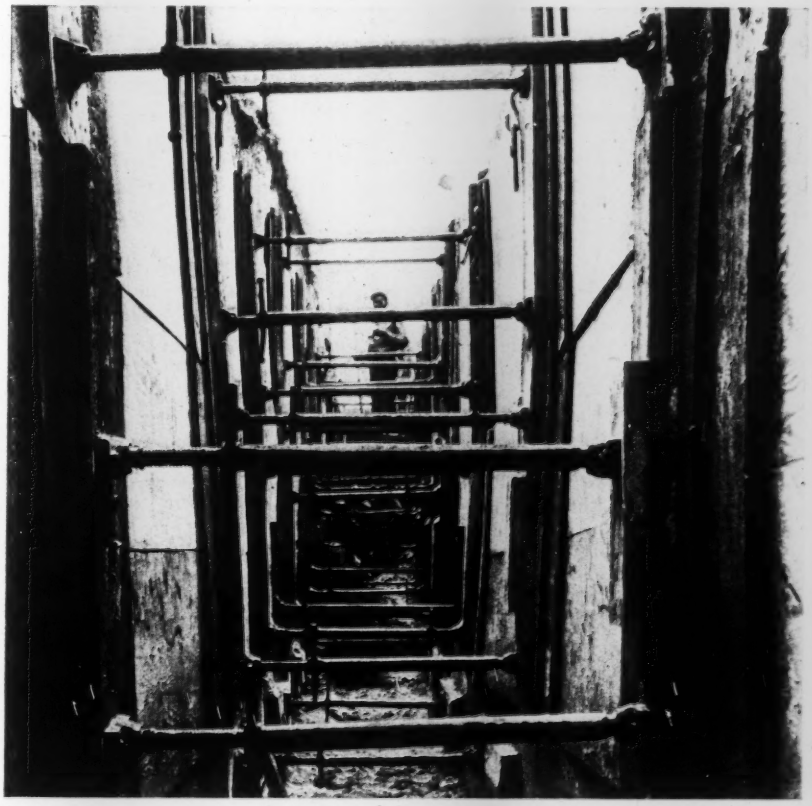
On the Bloom Township work the use of the new plywood sheeting method has proved highly economical. In fact, savings in labor costs of more than 50 per cent and in materials costs in excess of 80 per cent have been recorded in installation of the sheeting. The ease in which the large panels are handled and placed accounts for much of the savings in labor costs. Elimination of the conventional heavy sheeting and wales permits a reduction in trench width. On these jobs the reductions vary from 6 to 12 in., with corresponding reductions in excavation and backfill quantities. Furthermore, the plywood panels do not extend above the ground surface, as timber shoring often does, thus causing no interference with surface operations, such as muck and pipe handling, excavation and backfill. The result is a general time saving for the entire job.

On the district's West Side Sanitary Sewer, when the sheeting system was tried last winter for the first time, costs were reduced so much over the original estimate that it was possible to proceed with the East Side Sewer, which had been previously held up for lack of funds. Excavation and backfill ran from 80 to 85 per cent of the quantities estimated for conventional shoring methods. The amount of sheeting material was reduced by surprising amounts. On the West Side job 12,500 sq.ft. of plywood was sufficient for 1½ miles of 21-in. to 36-in. sewer, 14 to 21 ft. deep. Some 75,000 ft.bm. of timber and lumber had been purchased originally for this job before introduction of the panels.

After an exposure of four months to winter and spring weather, and repeated reuse on the West Side job, 65 per cent of the plywood was salvaged and, with 13,400 sq.ft. of new material, was used on the 2-mile East Side project. The amount of plywood purchased averaged only 2 sq.ft. per lin.ft. of sewer. All plywood used was Douglas fir, concrete form grade, which is made up with special water-resistant glue and is designed for repeated reuse.

For the most part the sewers have been built under adverse weather conditions. Excavation is largely through heavy clay. In trenches more than 12 ft. deep wet sand and water are encountered in numerous places, but the panels with jacks 8 ft. apart prove adequate to hold the ground. Lifting holes at the corners of the panels facilitate handling of the sheets with A-frame derricks straddling the trench.

The project is being carried out under the WPA. E. B. Dowd, construction engineer in charge of the WPA, developed the plywood sheeting system. The writer is engineer in charge for the district.



Plywood panels and screw jacks form shoring system for sewer trenches. Note hooks on top row of panels for handling sheets.

FROM FIELD AND OFFICE

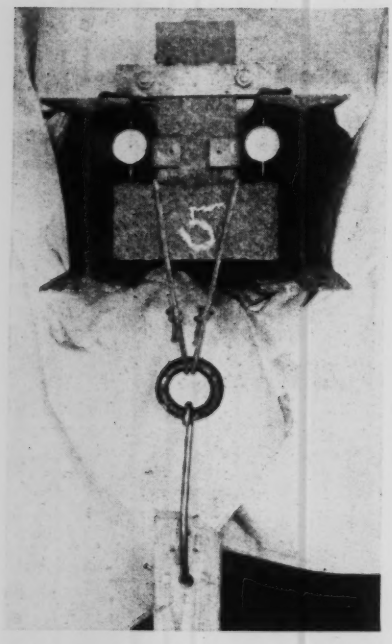
Working problems and time-saving methods . . . Edited by Charles S. Hill

Test of Filler-to-Brick Bond

H. Z. SCHOFIELD
Director Research Bureau,
National Paving Brick Association,
Columbus, Ohio

A study of the bonding properties of joint fillers made in the research laboratory of the National Paving Brick Association has developed a simple testing device that can be made in any field or central headquarters laboratory. In preparing a test specimen, two bricks are laid flat in a T on a level sand cushion, the end of one brick being spaced $\frac{1}{8}$ in. from the center of the plain side of the second brick. The resulting joint is then poured with filler and the excess filler material is removed.

By means of steel cross-plates firmly bolted across the vertical brick, the test specimen is hung on the top flanges of two I-beams, thus leaving the bottom brick supported



A home-made device like this will give quick measurements of stretch and rupture of brick joint fillers

only by the filler joint. Over the bottom brick are placed two rope stirrups and from the bottom of these stirrups is swung a wood post studded with hooks from which loading weights are hung. To determine the movement of the bottom brick during progressive loading, two dial gages are rigidly clamped to the vertical brick. To insure accurate seating for the dial-gage pins on the bottom brick, it is capped with small glass plates and plaster of Paris. When the test specimen is so hung that the filler joint is level and when the dial gages are placed, 10-lb. weights are added at intervals of 15 sec. until failure occurs.

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Wash Control on Cut Slopes

S. J. WALSH
Resident Engineer,
State Department of Highways,
Olympia, Wash.

Rather successful erosion control on a high cut slope of gravel and sand on recent Washington state road work was accomplished as follows: The cut, of gravel and sand, with a $1\frac{1}{2}$ to 1 slope, has a depth of 105 ft. at the highest point and a length of about 1,000 ft. The slope areas were divided laterally at 10-ft. intervals with cedar baffles (1x4, 1x6 and 1x8 in. No. 2 common rough cedar was used). These baffles were set into the slope with 1 in. remaining exposed and held in place with cedar stakes set at 4 ft. intervals ($1\frac{1}{4}$x2x24 in. split cedar stakes proved to be the ideal driving size). Where severe erosion occurred, secondary baffles were placed 3 ft. below the original baffles and braced to them. Top soil was spread over the area $\frac{1}{2}$ in. deep and seed broadcast immediately thereafter. (Seed used: 3 parts English rye, to 1 part white clover at the rate of 35 lb. per acre.)

Gullies resulting from heavy rains were packed with field sod. This proved to be a most satisfactory method for controlling this type of erosion.

In late spring, it became apparent that some protection was necessary for the young grass. Alder sawdust was the best available material. This was blown over the entire area; $\frac{1}{2}$ in. being the approximate depth of covering. This was followed by an application of commercial fertilizer, which encouraged decomposition of the sawdust and gave necessary plant food. The results of this mulch have proven very satisfactory; there has been no erosion on the slope of this cut during the past winter.

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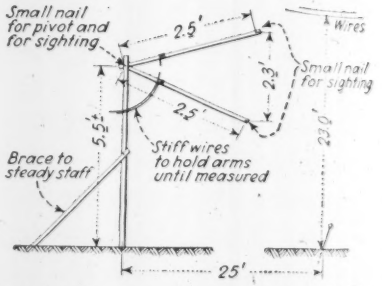
Measuring Live-Wire Height

E. J. CONNELL
Kline, Colo.

Knowing two men who were killed when one of them threw a tape over a live wire to find its clearance, the writer worked out the simple device shown by the accompanying sketch when he had a similar measurement to make. It was made of $\frac{1}{4}$x1-in. pieces of window-stop moulding, and was used as follows: Directly under the wires to be measured for clearance a chaining pin was stuck



Device for measuring clearance height of live electric wires.

through the ring of a tape and into the ground, (a small weight could be used on hard-surfaced streets) and a distance of 25 ft. measured from the end of the tape. The upper arm was sighted on the lowest wire, and the lower arm on the end of the tape. Pieces of stiff wire were used to hold the arms until measurement between the ends was made. If the sighting is carefully done the approximate clearance in feet will be the distance between the points at the ends of the arms in tenths of feet.

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Prespraying Aids Soot Removal

Experiments made by the British Building Research Board and outlined in its 1937 report indicate that soot and dirt can be removed with ease from soot-blackened limestone,

CAMERA MEMORANDA

1. Improvised anvils set up along the curb were provided WPA workers who broke the old paving brick removed from a Chicago street into aggregate for a new cement-bound macadam surface.

2. On the same street when the spread aggregate had to lay some time before grouting it was covered with burlap to keep out the dirt that might clog the voids and make grout penetration less thorough.

if the dirt is first softened by applying to it a fine, misty spray of water for a suitable time. During 1937, preliminary tests were carried out on three buildings in London, two of Portland stone, each about 70 years old, and one, about 100 years old, of Bath stone. After spraying for one hour, it was found that the Bath stone could be brought to a good appearance by light brushing. After two hours, apart from its weathered appearance, the condition of the masonry could hardly be distinguished from new stone-work. Equally promising results were obtained on Portland stone.

These trials were so satisfactory that it was decided to proceed with the complete cleaning of the Bath stone building and one of the Portland stone buildings. The results on the Bath stone building were very satisfactory. Delicate carving on parts of the face of the building, which could not have been cleaned by the old method of scrubbing with water, except by vigorous brushing involving some risk of damage, has been cleansed with ease and without injury by the spray method. The Portland stone building, which is situated in the city of London, was exceedingly dirty; the soot was greasier and more difficult to remove than on the Bath stone. But even here, most of the soot and dirt could be removed with ease after spraying for an hour or two.

Listening Rod Locates Leaks

GEO. A. POSNER
Los Angeles, Calif.

Finding leaks in water mains without a lot of excess excavation is accomplished in one southern California municipality by using a sounding rod. Briefly, the process is as follows:

1—The approximate location of the leak is ascertained through ground dampness. Then with pneumatic drilling equipment, holes are drilled down to the water main. (Definite location of the pipe line, of course, is determined by the department maps). These holes are several feet apart, along the pipe.

2—A steel rod is then inserted in each hole; its contact with the main carries an audible hum to the listening ear of the trouble shooter. Since this hum increases or decreases with proximity to the leak, the exact point of the break may thus be determined.

3—Excavation is then made down to the pipe line, sufficient to admit the body of the repair man, who in an inverted position in the hole works in the muddy water until the leak is caulked.

Listening to the hum of escaping water to locate a water main leak.

$10 AUGUST BONUS

THE CONTRIBUTION to the July Field and Office pages considered by the editor of the F & O section to be most helpful to the readers *will win for the author $10 over and above the regular payment for such items.*

▶All contributions received in the contest and accepted by the editor for publication will be paid for at regular rates.

▶Items to be considered must be received at the editorial office, 330 W. 42 St., New York City between July 21 and August 18.

▶Items must not be over 500 words long.

▶Announcement of the award will be published in the August 25 issue.